

Bricker Urinary Diversion after Radical Cystectomy: A Comparative Analysis of Laparoscopic vs. Robotic Approach in Terms of Quality of Life, Perioperative Outcomes and Postoperative Complications

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Abbreviations:

MIBC: muscle-invasive bladder cancer;

NMIBC: non-muscle-invasive bladder cancer;

RC: radical cystectomy;

LRC: laparoscopic radical cystectomy;

RARC: robot-assisted radical cystectomy;

HRQoL: health-related quality of life;

EQ-5D-5L: EuroQol 5-Dimensions 5-Level;

EQ-VAS: EuroQol Visual Analogue Scale;

eGFR: estimated glomerular filtration rate;

UTI: urinary tract infection;

IQR: interquartile range;

SPSS: Statistical Package for the Social Sciences;

GFR: glomerular filtration rate;

Hb: hemoglobin.

Rezumat

Derivație ileală de tip Bricker după cistectomie radicală: comparație între abordul laparoscopic și cel robotic în ceea ce privește calitatea vieții și complicațiile perioperatorii respectiv postoperatorii

Introducere: Cistectomia radicală cu derivație urinară ileală de tip Bricker reprezintă tratamentul standard pentru cancerul vezical musculo-invaziv (MIBC) localizat precum și pentru cancerul vezical non-musculo-invaziv cu risc crescut (NMIBC). În contextul tranziției către tehnici minim invazive, compararea abordului laparoscopic (LRC) cu cel asistat robotic (RARC) devine esențială, mai ales în ceea ce privește morbiditatea perioperatorie și calitatea vieții postoperatorii. Totuși, datele din practica clinică reală din Europa de Est rămân limitate. **Scop:** Compararea rezultatelor clinice peri- și postoperatorii, precum și a calității vieții la pacienții supuși cistectomiei radicale cu derivație urinară de tip Bricker prin abord laparoscopic versus robotic.

Material și Metodă: Studiu retrospectiv, observațional, desfășurat între martie 2023 – martie 2025 în două centre universitare din Cluj-Napoca, România. Au fost incluși 37 de pacienți diagnosticați cu MIBC, alocați în două grupuri în funcție de abordul chirurgical: laparoscopic (n=22) și robotic (n=15). Parametrii clinici, biologici și chirurgicali au fost colectați pre- și post-operator. Calitatea vieții a fost evaluată la 3 luni utilizând instrumentele EQ-5D-5L și scala vizual-analogică EQ-VAS. Analizele statistice au inclus teste t, Mann-Whitney U, modele de regresie liniară și coeficienți de corelație, cu prag de semnificație p<0,05.

Received: 26.05.2025

Accepted: 24.07.2025

Rezultate: Grupul robotic a prezentat o funcție renală postoperatorie semnificativ mai bună (eRFG: $84,2 \pm 5,88$ vs. $66,55 \pm 5,59$ ml/min/1,73m²; $p=0,041$) și o durată medie de spitalizare redusă (mediana: 7 zile, IQR 6–8 vs. 9 zile, IQR 7–13; $p=0,045$), în ciuda unui timp operator mai lung ($463 \pm 25,4$ vs. $415 \pm 21,52$ minute). Complicațiile postoperatorii severe au fost semnificativ mai frecvente în grupul laparoscopic (54,5% vs. 6,7%; $p=0,004$). Infecțiile urinare preexistente, mai frecvente în LRC (45,5% vs. 20%), s-au asociat independent cu scăderea funcției renale postoperatorii ($\beta = -0,39$, $p=0,005$). Scorul mediu EQ-VAS a fost superior în grupul robotic ($84,93 \pm 2,64$ vs. $76,81 \pm 4,42$; $p<0,01$), în ciuda unui indice de utilitate EQ-5D-5L mai scăzut ($0,52 \pm 0,12$ vs. $0,72 \pm 0,05$; $p=0,02$), indicând o percepție globală favorabilă asupra stării de sănătate, în ciuda unor afectări funcționale obiective. Complicațiile postoperatorii au fost corelate cu o scădere semnificativă a scorului EQ-VAS ($71,39 \pm 20,49$ vs. $88,37 \pm 71,13$; $p=0,004$).

Concluzii: În contextul clinic real est-european, abordul robotic al cistectomiei radicale cu derivație Bricker s-a asociat cu o funcție renală mai bine conservată, spitalizare redusă și incidență mai mică a complicațiilor severe. Infecțiile de tract urinar preoperatorii au influențat negativ funcția renală, independent de eRFG inițială. Deși pacienții RARC au prezentat afectări funcționale mai pronunțate conform EQ-5D-5L, percepția globală a stării de sănătate (EQ-VAS) a fost semnificativ mai bună, sugerând rolul așteptărilor tehnologice și al satisfacției postoperatorii. Rezultatele susțin implementarea chirurgiei robotice în centrele urologice avansate și evidențiază necesitatea unor studii prospective, randomizate, cu urmărire extinsă, orientate pe rezultate funcționale și calitatea vieții.

Cuvinte cheie: cistectomie asistată robotic, cistectomie laparoscopică, derivație urinară Bricker, cancer vezical musculo-invaziv, calitatea vieții, EQ-5D-5L, scala vizual-analogică EQ-VAS, funcție renală, complicații postoperatorii; chirurgie minim invazivă

Abstract

Introduction: Radical cystectomy with ileal conduit urinary diversion (Bricker technique) remains the standard treatment for localized muscle-invasive bladder cancer (MIBC), as well as for high-risk non-muscle-invasive bladder cancer (NMIBC). Amid the transition toward minimally invasive techniques, comparing laparoscopic radical cystectomy (LRC) with robot-assisted radical cystectomy (RARC) becomes essential, particularly regarding perioperative morbidity and postoperative health-related quality of life. However, real-world data from Eastern Europe remain limited. **Objective:** To compare peri- and postoperative clinical outcomes and quality of life in patients undergoing radical cystectomy with Bricker urinary diversion via laparoscopic versus robotic approach.

Materials and Methods: This is a retrospective, observational study conducted between March 2023 and March 2025 in two academic centers in Cluj-Napoca, Romania. A total of 37 patients diagnosed with MIBC were included and allocated into two groups based on the surgical approach: laparoscopic ($n=22$) and robotic ($n=15$). Clinical, biological, and surgical parameters were collected pre- and postoperatively. Quality of life was assessed at 3 months using the EQ-5D-5L and EQ-VAS instruments. Statistical analyses included t-tests, Mann-Whitney U tests, linear regression models, and correlation coefficients, with a significance threshold of $p<0.05$.

Results: The robotic group demonstrated significantly better postoperative renal function (eGFR: 84.2 ± 5.88 vs. 66.55 ± 5.59 ml/min/1.73m²; $p=0.041$) and a shorter median hospital stay (7 days, IQR 6–8 vs. 9 days, IQR 7–13; $p=0.045$), despite a longer operative time (463 ± 25.4 vs. 415 ± 21.52 minutes). Severe postoperative complications were significantly more frequent in the laparoscopic group (54.5% vs. 6.7%; $p=0.004$). Pre-existing urinary tract infections, more common in the LRC group (45.5% vs. 20%), were independently associated with decreased postoperative renal function ($\beta = -0.39$, $p=0.005$). The mean EQ-VAS score was higher in the robotic group (84.93 ± 2.64 vs. 76.81 ± 4.42 ; $p<0.01$), despite a lower EQ-5D-5L utility index (0.52 ± 0.12 vs. 0.72 ± 0.05 ; $p=0.02$), indicating an overall favorable health perception despite objectively reduced functional outcomes. Postoperative complications were significantly correlated with decreased EQ-VAS scores (71.39 ± 20.49 vs. 88.37 ± 71.13 ; $p=0.004$).

Conclusions: In the real-world clinical setting of Eastern Europe, the robotic approach to radical cystectomy with Bricker urinary diversion was associated with better preserved renal function, shorter hospitalization, and a lower incidence of severe complications. Preoperative urinary tract infections negatively impacted renal function independently of baseline eGFR. Although RARC patients showed more pronounced functional impairments as measured by EQ-5D-5L, their overall health perception (EQ-VAS) was significantly better, suggesting the influence of technological expectations and postoperative satisfaction. These results support the implementation of robotic surgery in advanced urological centers and highlight the need for prospective, randomized trials with extended follow-up focusing on functional outcomes and quality of life.

Keywords: robot-assisted cystectomy, laparoscopic cystectomy, Bricker urinary diversion, muscle-invasive bladder cancer, quality of life; EQ-5D-5L, EQ-VAS visual analogue scale, renal function, postoperative complications, minimally invasive surgery

Introduction

In recent decades, specialized literature has proposed multiple definitions of the concept of “cancer survivorship,” applicable to all types of cancer, yet without reaching a clear consensus. Recent literature considers an oncologic patient a ‘survivor’ from the moment of diagnosis, regardless of disease stage or estimated prognosis. However, there remains ongoing debate regarding the appropriate time frame for such clinical and psychological labeling (1).

Approximately one quarter of bladder tumors are diagnosed at the muscle-invasive stage (2). For non-metastatic muscle-invasive bladder cancer (MIBC), as well as for high-risk non-muscle-invasive forms (NMIBC), the standard treatment consists of radical cystectomy with bilateral lymphadenectomy, complemented, in eligible patients, by neoadjuvant chemotherapy (2-10). Radical cystectomy can be performed via open, laparoscopic, or robot-assisted approaches (2). The first laparoscopic intervention of this type in a patient with neurogenic bladder was reported in 1992 by Parra et al. (11), and in 2003, Menon et al. described the first robot-assisted radical cystectomy with intracorporeal urinary diversion (11-13).

The da Vinci surgical robots, particularly the SI and XI generations, are the most commonly used platforms for robot-assisted radical cystectomy (RARC), offering significant advantages through enhanced surgical precision, magnified three-dimensional visualization, and superior instrument control (3,6,14). The single-port (SP) da Vinci system enables surgery through a single incision and holds potential for reducing postoperative pain and improving visualization in narrow anatomical spaces. Among the innovative features of this system are the capacity to reposition the robotic arm to access all four abdominal quadrants and a virtual navigator that provides real-time feedback on instrument positioning, even in partially obscured anatomical regions.

Robot-assisted radical cystectomy with ileal conduit urinary diversion (Bricker technique) has been associated with significant clinical benefits compared to laparoscopic or open approaches, including shorter operative time, reduced blood loss, earlier return of bowel function, shorter hospital stay, lower transfusion requirements, faster recovery, and reduced incidence of peri- and postoperative complications (2,4-6,8,10-11,13,15-19).

Quality of life (QoL) is frequently affected in patients undergoing this surgery, primarily due to

the severity of the disease, the complexity of the procedure, associated complications, the type of urinary diversion employed, and the postoperative esthetic impact (4,18). Since the 1990s, the European-validated EQ-5D instrument has emerged as a standard for assessing self-perceived health status and health-related quality of life (HRQoL), allowing comparisons between diseases and patient populations, as well as with the general population. EQ-5D value sets summarize the responses provided for the five dimensions of the questionnaire – mobility, self-care, usual activities, pain/discomfort, and anxiety/depression – each rated on severity levels (20-23).

Radical cystectomy with ileal conduit urinary diversion (Bricker technique) represents the therapeutic standard for patients diagnosed with localized muscle-invasive bladder tumors. The trend toward minimally invasive techniques is evident, driven by the favorable outcomes published in recent decades. Although numerous international studies have explored the benefits of these techniques, comparative data from real-world clinical practice, particularly with regard to functional impact and postoperative quality of life perception, remain limited, especially in the context of Eastern European countries.

The aim of the present study is to compare the incidence of peri- and postoperative complications, as well as quality of life, in patients undergoing intracorporeal ileal conduit urinary diversion (Bricker technique) performed via laparoscopic versus robotic approach. Quality of life was assessed three months postoperatively in an academic center in Romania using the European-validated EQ-5D-5L instrument, in order to identify functional differences and their impact on patients’ perceptions of postoperative health status. The findings may contribute to optimizing therapeutic decisions and individualizing surgical treatment strategies based on institutional context and patient-specific characteristics.

Materials and Methods

This observational, retrospective study was conducted in two medical institutions in Cluj-Napoca, Romania, with the primary objective of comparing peri- and postoperative clinical outcomes following intracorporeal Bricker-type ileal conduit urinary diversion performed via laparoscopic versus robotic approach, subsequent to radical cystectomy for muscle-invasive bladder cancer. The secondary objective was to assess

quality of life at 3 months postoperatively using the European-validated EQ-5D-5L instrument, as well as to identify factors associated with reduced postoperative renal function and diminished perceived health status, as measured by the EQ-VAS visual analogue scale, including postoperative complications and self-reported social support.

Patient selection was carried out through a rigorous, standardized process aimed at minimizing selection bias and ensuring comparability between groups. The choice of surgical technique (laparoscopic or robotic) was not influenced by individual clinical characteristics, but solely reflected institutional protocols and the availability of the surgical platform in each center, in line with current clinical practice. Inclusion and exclusion criteria were applied symmetrically to both groups, ensuring comparability. Patients were excluded only in cases of missing essential data or inability to accurately complete the evaluation questionnaires, without any direct association with disease severity or prognosis. Moreover, preoperative demographic and clinical characteristics of the two groups were statistically compared, revealing no significant differences, thereby supporting cohort homogeneity and minimizing the risk of baseline confounders affecting postoperative outcomes.

Initially, 46 consecutive patients diagnosed with muscle-invasive bladder tumors and undergoing radical cystectomy with Bricker urinary diversion between March 2023 and March 2025 were identified at Cluj-Napoca Municipal Clinical Hospital (laparoscopic approach) and Medcover Cluj-Napoca Hospital (robotic approach).

To be eligible, patients had to meet all of the following inclusion criteria: age ≥ 18 years, histopathologically confirmed diagnosis of muscle-invasive urothelial carcinoma, completion of radical cystectomy with Bricker-type urinary reconstruction, availability of relevant clinical and biological data both preoperatively and at three months postoperatively, and the ability to complete the EQ-5D-5L questionnaire in the postoperative period. A total of 9 patients were excluded: 4 due to missing preoperative or postoperative biological data, 3 due to loss to postoperative clinical follow-up, and 2 due to documented cognitive impairments preventing valid completion of the questionnaire. The exclusion of these cases was essential to maintain methodological rigor, avoid data imputation, and ensure a homogeneous dataset in terms of data quality. Thus, the final analysis was conducted on a cohort of 37 eligible patients, allocated according to the surgical

technique used in the center where they were treated.

The relatively small sample size is attributable to the specialized and restrictive nature of the therapeutic indication, which applies exclusively to oncologically and surgically eligible cases for radical cystectomy with Bricker diversion. Moreover, the differentiated implementation of minimally invasive technologies in the two centers reflected operative volumes proportionate to institutional resources and the distribution of surgical expertise. The application of strict selection criteria and the requirement for complete and validated data inevitably narrowed the cohort, yet allowed for a robust and coherent statistical analysis applicable to real-world clinical practice.

For each patient, demographic data (age, sex, area of residence), pre- and postoperative biological parameters (estimated glomerular filtration rate – eGFR, hemoglobin), presence of preoperative urinary tract infection, operative duration, length of hospital stay, type and frequency of postoperative complications, tumor staging before and after surgery, and information regarding social support were collected.

Quality of life was assessed at three months postoperatively using the EQ-5D-5L questionnaire, which evaluates five health dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension was rated on a five-level ordinal scale from 1 (no problems) to 5 (extreme problems). For each patient, a five-digit code corresponding to the individual configuration of responses was recorded (e.g., 22341). Individual responses were converted into a utility index using validated European population algorithms, without employing cumulative raw scores. The utility index was calculated using algorithms validated for the European population. Perceived health status was assessed using the EQ-VAS visual analogue scale, ranging from 0 (the worst imaginable health state) to 100 (the best imaginable health state). Social support was recorded as a binary variable (present/absent), based on patient self-report.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics version 25 and Microsoft Excel/Word 2024. Quantitative data were described using means and standard deviations for normally distributed variables, or medians and interquartile ranges (IQR) for non-normally distributed data,

with normality assessed via the Shapiro-Wilk test. Comparison of quantitative variables between independent groups was conducted using the Student's t-test for equal variances and the Welch t-test for unequal variances (confirmed via the Levene test). For non-normally distributed variables, Mann-Whitney U or Kruskal-Wallis H tests were applied, with Dunn-Bonferroni post hoc adjustments. For paired comparisons (pre- and postoperative), the paired t-test was used. Correlations between quantitative variables were assessed using the Pearson coefficient for normally distributed data and the Spearman coefficient for non-normal data.

To analyze the effect of preoperative urinary tract infection on postoperative eGFR values, adjusted for preoperative eGFR, a multiple linear regression model was constructed. The assumptions of the model (linearity, homoscedasticity, independence of residuals, absence of multicollinearity) were verified, and results were expressed as standardized beta coefficients, 95% confidence intervals, and statistical significance levels. Qualitative variables were analyzed using Fisher's exact test, and proportions between subgroups in contingency tables were compared using Z-tests with Bonferroni correction. The accepted significance threshold was $p < 0.05$.

Ethical Statement

The study was conducted in accordance with the principles of the Declaration of Helsinki and was

approved by the ethics committees of both participating institutions. All patients provided written informed consent for the anonymous use of their data for scientific purposes and for quality-of-life evaluation during the postoperative period.

Results

The comparative analysis of the two surgical techniques used for Bricker-type urinary diversion - laparoscopic versus robotic approach - included 37 patients, diagnosed with muscle-invasive urothelial carcinoma, who underwent radical cystectomy in two clinical centers in Cluj-Napoca, Romania, between March 2023 and March 2025. The results were analyzed in relation to pre- and postoperative clinical parameters, associated complications, and quality-of-life scores, aiming to identify significant differences between the two types of intervention (Table 1, Fig. 1).

Patients in the robotic surgery group presented a more favorable preoperative clinical profile. The mean age was lower in the robotic group (61.2 ± 2.69 years, median = 62) compared to the laparoscopic group (63.63 ± 1.76 years, median = 65.5). Most patients in both groups were male, with a higher proportion in the robotic group (86.7% vs. 72.7%). This is supported by Fig. 1, which illustrates a male predominance significantly associated with high tumor grade (G3/G4) and increased incidence of postoperative complications ($p < 0.05$).

Urban residence was more frequent in the robotic group (73.3% vs. 54.5%). Regarding pre-

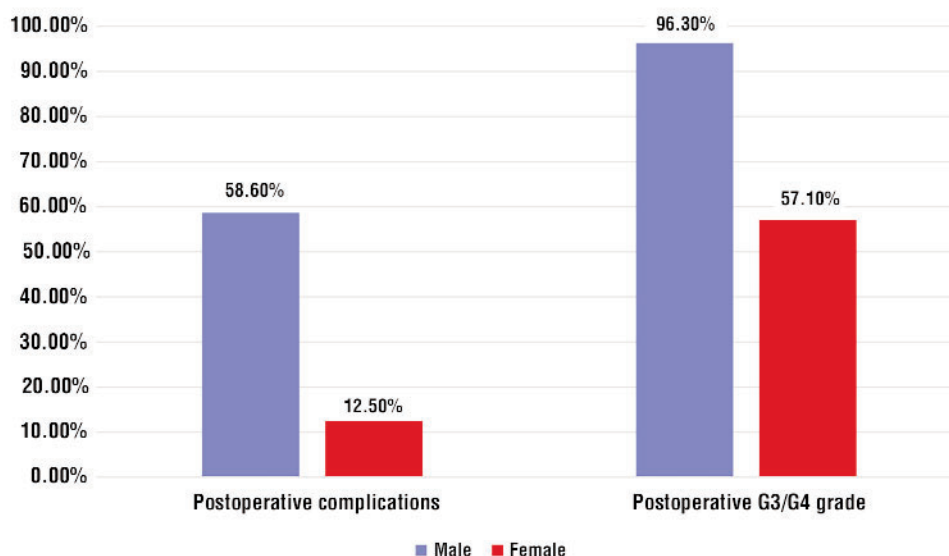


Figure 1. Distribution of patients by gender, postoperative complications, and preoperative tumor grade

Table 1. Characteristics of patients included in the study

Parameter	LRC	RARC
<i>Demographic Variables</i>		
Gender (Male) (%)	72.7	86.7
Age (Mean $\pm$ SD, Median)(years)	63.63 $\pm$ 1.76, 65.5	61.2 $\pm$ 2.69, 62
Urban Residence (%)	54.5%	73.3%
<i>Temporal Variables</i>		
Operative Time (Mean $\pm$ SD, Median)(minutes)	415 $\pm$ 21.52, 410	463 $\pm$ 25.4, 460
Length of Hospital Stay (Mean $\pm$ SD, Median)(days)	10.22 $\pm$ 0.88, 9	7.8 $\pm$ 0.71, 7
<i>Preoperative Variables</i>		
Preoperative eGFR (Mean $\pm$ SD, Median) (ml/min/1.73 m ²)	70.9 $\pm$ 5.29, 73.5	88.44 $\pm$ 6.56, 94
Preoperative Hemoglobin (Mean $\pm$ SD, Median) (g/dl)	12.47 $\pm$ 1.67, 12.25	13.39 $\pm$ 0.5, 14
Preoperative UTIs (%)	45.45	20
Preoperative JJ Stents (%)	4.5	0
<i>Postoperative Variables</i>		
Postoperative eGFR (Mean $\pm$ SD, Median) (ml/min/1.73 m ²)	66.55 $\pm$ 5.59, 65.5	84.2 $\pm$ 5.88, 83
Postoperative Hemoglobin (Mean $\pm$ SD, Median) (g/dl)	10.46 $\pm$ 0.29, 10.2	10.8 $\pm$ 0.35, 10.6
<i>Complications</i>		
Overall Postoperative Complications (%)	54.5	40
Postoperative UTI (%)	13.6	20
Ileus (%)	4.5	20
Pyelonephritis (%)	13.6	13.3
Other Complication (%)	54.5	6.6
<i>Preoperative Tumor Staging</i>		
Tx (%)	4.5	6.7
T1 (%)	27.3	26.7
T2 (%)	59.2	53.3
T3 (%)	4.5	6.7
T4 (%)	4.5	6.7
<i>Preoperative Tumor Grading</i>		
G1 (%)	4.5	0
G2 (%)	9.1	13.3
G3 (%)	86.4	86.7
<i>Postoperative Tumor Staging</i>		
pT0/pTis (%)	27.4	6.7
pT1 (%)	31.8	20
pT2 (%)	4.5	13.3
pT3 (%)	31.8	46.7
pT4 (%)	4.5	13.3
Adjuvant Therapies (%)	18.18	40
<i>EQ-5D-5L Questionnaire Parameters– EQ-5D-5L</i>		
Mobility (Mean $\pm$ SD, Median)	1.63 $\pm$ 0.24, 1	2.53 $\pm$ 0.19, 1
Self-Care (Mean $\pm$ SD, Median)	1.72 $\pm$ 0.27, 1	2.6 $\pm$ 0.48, 2
Usual Activities (Mean $\pm$ SD, Median)	2.63 $\pm$ 0.31, 3	2.86 $\pm$ 0.43, 3
Pain/ Discomfort (Mean $\pm$ SD, Median)	2.18 $\pm$ 0.25, 2	2.53 $\pm$ 0.35, 3
Anxiety/Depression (Mean $\pm$ SD, Median)	2.27 $\pm$ 0.28, 2 (1-4)	2.86 $\pm$ 0.4, 3
Total EQ-5D-5L Score (Mean $\pm$ SD, Median)	10.45 $\pm$ 0.99, 9	13.46 $\pm$ 1.99, 12
EQ-5D-5L Utility Index (Mean $\pm$ SD, Median)	0.72 $\pm$ 0.05, 0.85	0.52 $\pm$ 0.12, 0.71
EQ-VAS Score (Mean $\pm$ SD, Median)	76.81 $\pm$ 4.42, 80	84.93 $\pm$ 2.64, 85
Social Support (%)	72.7	73.3

operative renal function, patients in the robotic group had significantly better estimated glomerular filtration rates (eGFR) (88.44 $\pm$ 6.56 ml/min/1.73 m² vs. 70.9 $\pm$ 5.29 ml/min/1.73 m², $p=0.041$), as shown in *Table 1*, suggesting a more favorable case selection for robotic surgery and a possible correlation with

superior hematologic scores. Preoperative hemoglobin levels were also higher in the robotic group (13.39 $\pm$ 0.5 g/dl vs. 12.47 $\pm$ 1.67 g/dl), a difference explained by the positive correlation between eGFR and preoperative hemoglobin ($R=0.733$, $p<0.001$), as presented in *Table 2*.

Table 2. Correlations between preoperative eGFR and pre-/postoperative hemoglobin, operative time, and length of hospital stay

Correlation	p*
Preoperative eGFR (p=0.138**) X Preoperative Hemoglobin (p=0.427**)	<0.001, R = 0.733
Preoperative eGFR (p=0.138**) X Postoperative Hemoglobin (p=0.348**)	<0.001, R = 0.578
Preoperative eGFR (p=0.138**) X Operative Time (p=0.901**)	<0.001, R = 0.680
Preoperative eGFR (p<0.001**) X Length of Hospital Stay (p<0.001**)	0.011, R = 0.412***

*Pearson Correlation Coefficient, **Shapiro-Wilk Test, ***Spearman's rho Correlation Coefficient

Preexisting urinary tract infections (UTIs) were more frequent in the laparoscopic group (45.45% vs. 20%) and were significantly associated with reduced postoperative renal function (p<0.001), even after adjustment for baseline eGFR (p=0.005), according to data presented in *Table 3* and *Table 4*. The lower median postoperative eGFR in patients with UTI (42 ml/min/1.73 m²) compared to those without (83 ml/min/1.73 m²) indicates increased vulnerability to renal impairment in the presence of infection.

Operative time was longer in the robotic group (463 ± 25.4 minutes vs. 415 ± 21.52 minutes), yet

the length of hospitalization was significantly shorter (median = 7 days, IQR = 6-8 vs. 9 days, IQR = 7-13, p=0.045), as shown in *Table 5*. This seemingly paradoxical relationship is explained by the significant correlation between longer operative time and higher postoperative eGFR and hemoglobin levels, as well as shorter hospital stays (*Figs. 2-4*), suggesting a more meticulous and precise surgical intervention.

Postoperative renal function was better preserved in the robotic group (84.2±5.88 ml/min/1.73 m² vs. 66.55 ± 5.59 ml/min/1.73 m², p=0.041), reflecting both the favorable preexisting clinical

Table 3. Comparison of postoperative eGFR values based on presence of preoperative urinary tract infections (UTIs)

Preoperative UTIs	Mean ± SD	Median (IQR)	Mean Rank	p*
Absent (p=0.509**)	83.89 ± 18.86	83 (66.5-97.5)	23.38	<0.001
Present (p=0.011**)	52.5 ± 26.95	42 (38.75-61.25)	9.88	

*Mann-Whitney U Test, **Shapiro-Wilk Test

Table 4. Multivariable linear regression model for predicting postoperative eGFR

Parameter	Beta (95% Confidence Interval)	p
Preoperative eGFR	0.761 (0.593-0.930)	<0.001
Preoperative UTIs	-13.623 (-22.931 - -4.315)	0.005

Model Summary: VIF = 1.217/1.217, F(2,34)=70.745, p<0.001, Durbin-Watson = 1.593

Table 5. Distribution of patients according to surgical approach, presence of other postoperative complications, and comparison of hospital stay and postoperative eGFR

Surgery/Complications	LRC		RARC		p*
	n	%	n	%	
Absent	10	45.5%	14	93.3%	0.004
Present	12	54.5%	1	6.7%	
Surgery/Hospital Stay	Mean ± SD		Median (IQR)	Mean Rank	p***
LRC (p=0.011**)	10.23 ± 4.16		9 (7-13)	21.93	0.045
RARC (p<0.001**)	7.8 ± 2.75		7 (6-8)	14.70	
Surgery/ Postoperative eGFR	Mean ± SD		Median (IQR)	Mean Rank	p****
LRC (p=0.260**)	66.54 ± 26.24		65.5 (41.75-92.7)	-	0.041
RARC (p=0.190**)	84.23 ± 22.78		83 (65.7-104)	-	

*Fisher's Exact Test, **Shapiro-Wilk Test, ***Mann-Whitney U Test, ****Student T-Test

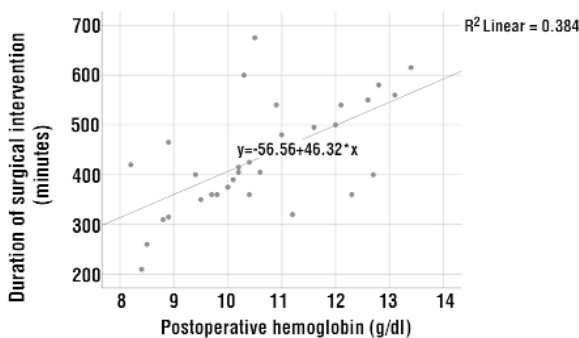


Figure 2. Correlation between postoperative hemoglobin and operative time

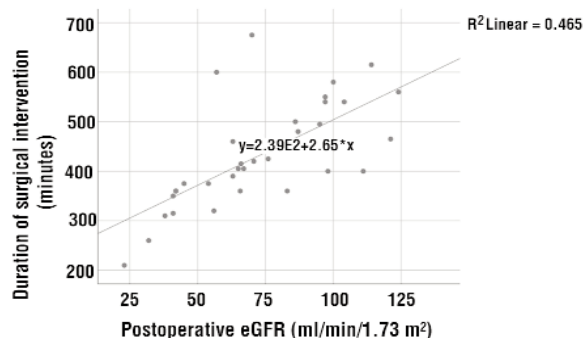


Figure 3. Correlation between operative time and postoperative estimated glomerular filtration rate (eGFR)

status and the protective nature of the surgical technique. Correlations between preoperative hemoglobin and postoperative eGFR further support this hypothesis.

Postoperative hemoglobin levels were slightly higher in the robotic group (10.8 ± 0.35 g/dl vs. 10.46 ± 0.29 g/dl), with a mean decrease of 2.24 ± 1.09 g/dl from preoperative values, a statistically significant reduction ($p < 0.001$). This reflects a relatively similar blood loss between groups, but a superior hematologic recovery capacity in the robotic group.

Postoperative complications were less frequent in the robotic group (40% vs. 54.5%), with a significant difference in the incidence of systemic or technical complications (e.g., sepsis, urinary fistula, lymphorrhea, deep vein thrombosis) (6.7% vs. 54.5%, $p = 0.004$), as shown in *Fig. 5*. This out-

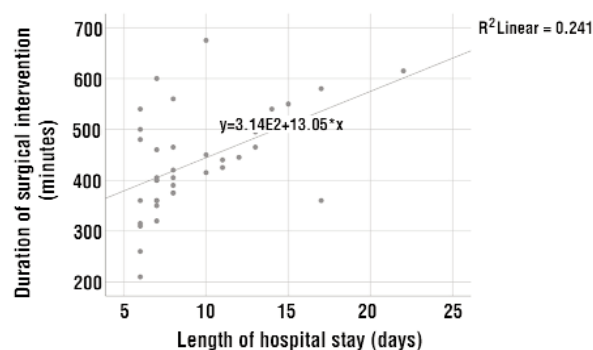


Figure 4. Correlation between operative time and length of hospital stay

come is attributed to the increased precision of robotic surgery and reduced trauma to adjacent

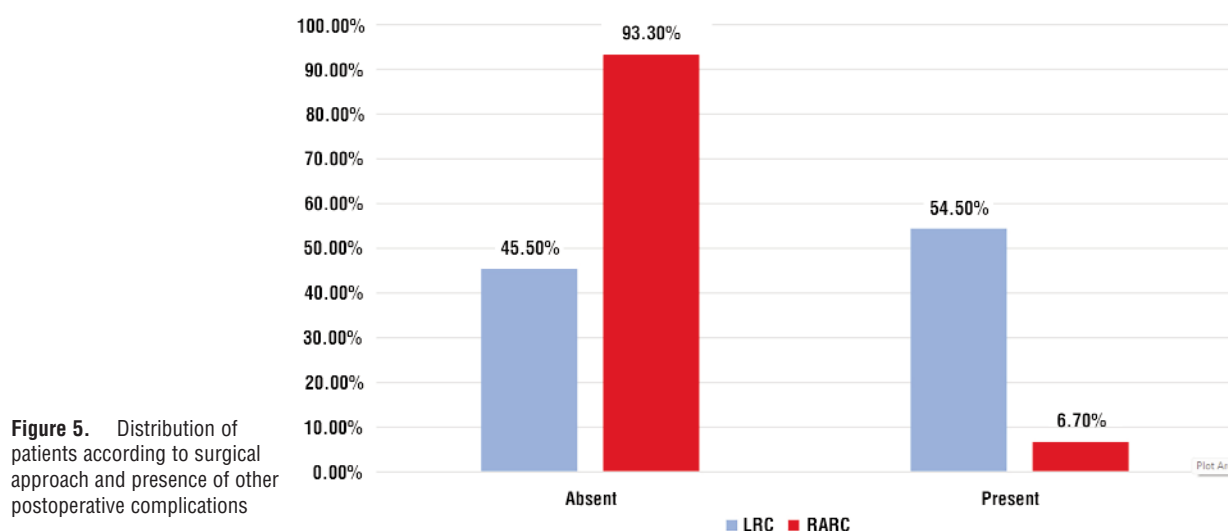


Figure 5. Distribution of patients according to surgical approach and presence of other postoperative complications

tissues, lowering the risk of perioperative complications.

The distribution of preoperative stages was comparable, with stage T2 predominating in both groups (53.3% robotic vs. 59.2% laparoscopic). Postoperatively, stage pT3 predominated in the robotic group (46.7%), while equal proportions of pT1 and pT3 were observed in the laparoscopic group (31.8% each). This difference may reflect better intraoperative staging accuracy and a tendency toward selecting more aggressive cases in the robotic group.

The need for adjuvant therapy was more frequent in the robotic group (40% vs. 18.18%), including neoadjuvant chemotherapy and BCG instillations, possibly indicating a more intensive therapeutic approach or more extensive tumor pathology.

Quality-of-life assessment at 3 months postoperatively (EQ-5D-5L and EQ-VAS) revealed a higher VAS score in the robotic group (84.93 ± 2.64 vs. 76.81 ± 4.42), despite more severe scores on the EQ-5D-5L dimensions, as shown in *Fig. 6*. This dissonance between overall perceived health and objectively impaired functionality may be explained by heightened patient expectations and a positive subjective evaluation influenced by advanced technology.

Despite objectively impaired functionality as indicated by EQ-5D-5L scores, patients in the robotic group reported higher VAS scores, suggesting a favorable global perception possibly influenced by technological expectations and immediate postoperative satisfaction.

Postoperative complications, particularly severe ones, were significantly associated with lower EQ-VAS scores (71.39 ± 20.49 vs. 88.37 ± 71.13 , $p=0.004$), indicating that perceived quality of life is closely related to immediate postoperative morbidity.

Moreover, patients who reported receiving social support had lower EQ-VAS scores, as presented in *Table 6*, possibly reflecting increased awareness of functional limitations or that such support was more often needed in complex cases.

The distribution of self-care scores by area of

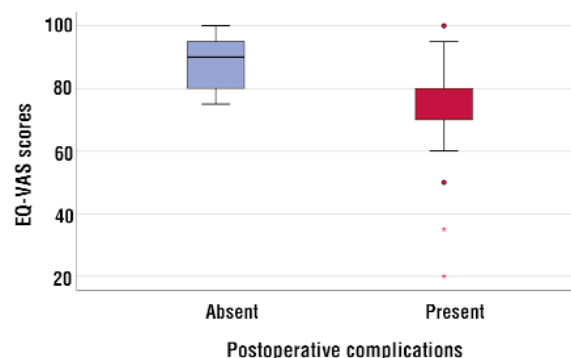


Figure 6. Comparison of EQ-VAS scores based on the presence of postoperative complications

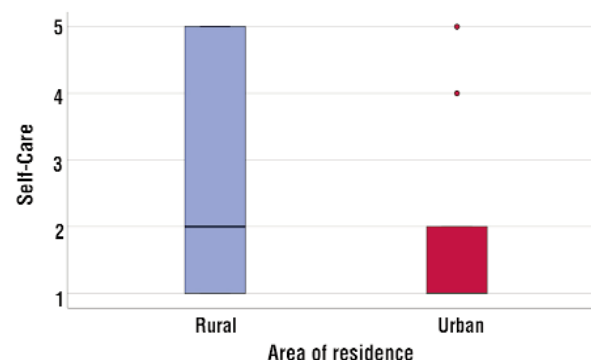


Figure 7. Comparison of self-care scores based on area of residence

residence is illustrated in *Fig. 7*, where urban patients had significantly better scores, potentially reflecting better access to postoperative care resources and family/medical support.

Key Findings

The results of this study suggest that the robotic approach to Bricker urinary diversion in the context of radical cystectomy is associated with a lower risk of complications, shorter hospitalization, and better postoperative renal function. Preoperative urinary tract infections negatively influenced renal functional prognosis, independently

Table 6. Comparison of EQ-VAS scores based on the presence of social support

Social Support	Mean $\pm$ SD	Median (IQR)	Mean Rank	p*
Absent ($p=0.018^{**}$)	96.4 ± 4.03	97 (93.75-100)	31.75	<0.001
Present ($p<0.001^{**}$)	74.07 ± 16.75	80 (70-85)	14.28	

*Mann-Whitney U Test, **Shapiro-Wilk Test

of baseline eGFR. Moreover, postoperative complications adversely impacted quality of life, while preexisting renal function and hematologic status were identified as relevant predictive factors for postoperative outcomes.

Discussion

This study compares laparoscopic radical cystectomy (LRC) with robot-assisted radical cystectomy (RARC), both performed with intracorporeal Bricker-type urinary diversion, in patients diagnosed with muscle-invasive bladder cancer. The retrospective evaluation included a detailed analysis of pre- and postoperative clinical parameters, complications, and quality-of-life scores to identify potential significant differences between the two minimally invasive techniques.

The results indicate that although both surgical approaches are generally safe and effective, the robotic approach was associated with certain clinically significant advantages. Postoperative renal function, as measured by estimated glomerular filtration rate (eGFR), was significantly better in the RARC group compared to the LRC group (84.2 ± 5.88 vs. 66.55 ± 5.59 ml/min/1.73 m²; $p=0.041$), and the median hospital stay was shorter in the robotic group (median = 7 days, IQR = 6–8) than in the laparoscopic group (median = 9 days, IQR = 7–13; $p=0.045$). Moreover, severe postoperative complications—including sepsis, urinary fistulas, lymphorrhea, and deep vein thrombosis—were significantly less frequent in the RARC group (6.6% vs. 54.5%; $p=0.004$), indicating a substantial advantage in perioperative safety.

Patient distribution revealed a more favorable preoperative profile in those undergoing robotic surgery, including younger age, better renal function, and a lower incidence of urinary tract infections. This trend is consistent with findings from multicenter studies suggesting that, in clinical practice, patients selected for robotic approaches often have a better biological status and fewer comorbidities (24,25). These factors may influence postoperative outcomes and must be considered in comparative analyses of the two techniques, even though surgical selection in our study was guided by institutional protocols rather than individual clinical criteria.

Although the operative time was longer in the robotic group (463 ± 25.4 minutes vs. 415 ± 21.52 minutes), this difference was not associated with increased morbidity. Postoperative hemoglobin values were comparable between the two groups

(10.8 ± 0.35 g/dl in RARC vs. 10.46 ± 0.29 g/dl in LRC), with no significant differences in blood loss. This may reflect the technical maturity of the surgical teams involved and that the learning curve had already been surpassed for both approaches (2,8,26). It is worth noting that longer operative times for RARC are commonly reported in the literature, particularly in centers during the early stages of robotic surgery implementation, suggesting a potential influence of the learning curve (27).

From an oncological perspective, no significant differences were observed in terms of tumor excision radicality or the number of lymph nodes removed. Both groups had comparable rates of complete resection, with no significant positive margins, supporting the notion that complete tumor excision can be safely achieved using either minimally invasive technique (3,5,7,18). Tumor stage distribution was similar, with stage T2 being predominant preoperatively in both groups, and a higher percentage of pT3 cases observed postoperatively in the RARC group.

A notable finding in our analysis is the superior preservation of renal function in the robotic group, both in terms of higher postoperative eGFR values and statistically significant differences compared to the laparoscopic group. These results are supported by recent literature reporting that the precision and reduced tissue trauma of robotic surgery may help mitigate postoperative nephrological impairment (28,29). Additionally, the rate of systemic complications was lower in the robotic group, aligning with findings from the RAZOR study and other randomized trials that demonstrated reduced morbidity associated with robotic surgery in the context of radical cystectomy (30,31).

Quality-of-life analysis using EQ-5D-5L and EQ-VAS at 3 months postoperatively yielded apparently paradoxical results. The mean EQ-VAS score was significantly higher in the RARC group (84.93 ± 2.64 vs. 76.81 ± 4.42), suggesting a more favorable global perception of health status. However, functional dimension scores of EQ-5D-5L were higher in the robotic group (mobility: 2.53 ± 0.19 vs. 1.63 ± 0.24 ; self-care: 2.6 ± 0.48 vs. 1.72 ± 0.27), and the utility index was significantly lower (0.52 ± 0.12 vs. 0.72 ± 0.05), indicating greater functional impairment. This dissociation between subjective global perception and objective functionality has also been reported by Dagenais et al. (32), who emphasized the role of patient expectations and postoperative satisfaction in modulating responses to quality-of-life assessments.

The presence of postoperative complications, particularly systemic ones, was associated with a significant decrease in EQ-VAS score (71.39 ± 20.49 vs. 88.37 ± 71.13 ; $p=0.004$), especially in cases with severe clinical evolution. This finding underscores the importance of minimizing morbidity to optimize psychosocial recovery, a concept supported by the current literature regarding the impact of adverse events on postoperative quality of life (32).

Another important aspect identified was the negative impact of pre-existing urinary tract infections on postoperative renal function and quality of life. Previous studies have shown that recurrent UTIs may exacerbate nephrological damage, particularly in the setting of major urologic interventions (33,34). This supports the importance of rigorous preoperative optimization, including the identification and complete treatment of active infections prior to surgery.

Our findings are consistent with recent literature. Long et al. (35), in a meta-analysis including approximately 2,400 patients, demonstrated that RARC is associated with significantly lower intraoperative blood loss (~ 80 ml) and a reduced incidence of late complications (>90 days) compared to LRC. Similarly, Yang et al. (36) reported lower transfusion rates, reduced global complications (minor and major), and fewer positive surgical margins in the RARC group compared to LRC.

Furthermore, the specialty literature supports that both minimally invasive approaches are superior to open surgery, offering substantial benefits such as faster recovery, less pain, quicker return of bowel function, and reduced transfusion requirements (4,25,36). Our study demonstrates that these benefits can also be reproduced in an Eastern European setting, within a regional clinical context provided there is appropriate infrastructure and surgical expertise.

Given the limited sample size ($n=46$), of which only 37 patients were fully evaluated for quality of life, definitive conclusions regarding the superiority of one technique over the other cannot be drawn. Nevertheless, observed trends - such as better renal function preservation, shorter hospital stays, and a lower incidence of severe complications in the RARC group - justify further investigation in larger cohorts.

The limitations of this study include its retrospective nature, lack of randomization, absence of cost-effectiveness evaluation, and the exclusive use of intracorporeal urinary diversion, limiting the applicability of conclusions to intracorporeal

diversions. Additionally, the lack of long-term follow-up does not allow for a complete evaluation of cancer-specific survival and late complications (e.g., ureteroenteric strictures, incisional hernias).

Future studies should include prospective, multicenter, randomized trials with extended follow-up and the integration of ERAS protocols, focusing not only on perioperative parameters but also on long-term quality of life, return to work and social reintegration, and sustained oncological efficacy. Qualitative assessments of patient experience - including psychosocial impact, body image, and sexual function - may offer a more nuanced perspective on the true impact of minimally invasive surgery.

Conclusions

This retrospective multicenter study conducted in two medical institutions in Cluj-Napoca highlights the significant clinical benefits associated with the robotic approach to radical cystectomy with intracorporeal Bricker-type urinary diversion, as compared to the laparoscopic technique, in the treatment of muscle-invasive bladder tumors. Patients who underwent robotic surgery demonstrated significantly better preserved postoperative renal function, shorter average hospitalization, and a lower incidence of severe postoperative complications, despite a longer operative time. These findings support the superiority of the robotic approach in terms of perioperative safety and functional preservation.

The more favorable preoperative clinical profile observed in the robotic group - characterized by better renal function, higher hemoglobin levels, and a lower incidence of urinary tract infections - positively influenced postoperative outcomes, emphasizing the importance of rigorous patient selection and systematic preoperative biological optimization. The presence of urinary tract infections prior to surgery was independently associated with a significant reduction in postoperative renal function, highlighting the necessity for careful screening and appropriate treatment before major surgical intervention.

The quality-of-life assessment at three months postoperatively revealed a significantly more favorable global perception in the robotically treated group, as reflected by higher EQ-VAS scores, despite more pronounced functional impairments in the EQ-5D-5L dimensions. This dissociation between subjective perception and objective functional evaluation suggests the

influence of patient expectations, satisfaction with the intervention, and the technological context on self-assessment of health status. Post-operative complications, particularly systemic ones, negatively impacted quality-of-life perception, underscoring the direct relationship between perioperative morbidity and psychosocial recovery.

The findings confirm the feasibility, safety, and efficacy of the robotic approach within an Eastern European context, under real-world clinical conditions, supporting international literature on the advantages of minimally invasive technologies in major oncological surgery. Moreover, these results underscore the need for the development of standardized protocols for preoperative selection, biological optimization, and multidimensional postoperative follow-up, with a particular focus on functional parameters and quality of life.

Limitations of the Study

The inherent limitations of the study - including the small sample size, retrospective design, and lack of long-term follow-up - warrant caution in generalizing the conclusions. Nevertheless, the obtained data provide a solid foundation for initiating prospective, randomized studies with extended follow-up, aimed at integrating not only oncological and functional evaluation but also patient-centered perspectives on health status, social support, reintegration, and the psychological impact of surgical treatment.

Author's Contributions

All authors made a significant contribution to the study conception, drafting of the scientific content, and critical revision of the manuscript. Each author has reviewed and approved the final version of the manuscript and accepts full responsibility for the accuracy and integrity of the data presented. C.G.R. had full access to the analyzed dataset and assumes responsibility for the validity and accuracy of the statistical analysis. All authors confirm adherence to international authorship criteria and consent to the publication of this article.

Conflict of Interest

The authors declare no financial or professional conflicts of interest that could have influenced the conduct or outcomes of this study.

Funding

This research did not receive any external funding.

Informed Consent

All patients included in the study provided written informed consent for participation and for the use of their medical data for scientific purposes, in compliance with principles of anonymity and confidentiality.

Data Availability Statement

The data supporting the conclusions of this study are available from the corresponding author upon reasonable request, in accordance with data protection regulations and participant confidentiality.

References

1. Russell B, Beyer K, Lawlor A, Roobol MJ, Venderbos LDF, Remmers S, et al. Survivorship data in prostate cancer: where are we and where do we need to be? *Eur Urol Open Sci.* 2023;59:27–9.
2. Doganca T, Argun ÖB, Tuna MB, Tüfek İ, Öbek C, Kural AR. Robot-assisted radical cystectomy with intracorporeal urinary diversion following neoadjuvant chemotherapy for muscle-invasive bladder cancer: an initial experience. *J Urol Surg.* 2024;11(2):67–71.
3. Rocco B, Garelli G, Assumma S, Turri F, Sangalli M, Calcagnile T, et al. Robot-assisted radical cystectomy: a single-center experience and a narrative review of recent evidence. *Diagnostics (Basel).* 2023;13:714.
4. Cochetti G, Paladini A, Del Zingaro M, Ciarletti S, Pastore F, Massa G, et al. Robot-assisted radical cystectomy with intracorporeal reconstruction of urinary diversion by mechanical stapler: prospective evaluation of early and late complications. *Front Surg.* 2023;10:1157684.
5. Han JH, Ku JH. Robot-assisted radical cystectomy: where we are in 2023. *Investig Clin Urol.* 2023;64(2):107–17.
6. Elsayed AS, Aldhaam NA, Nitsche L, Siam A, Jing Z, Hussein AA, et al. Robot-assisted radical cystectomy: review of surgical technique, and perioperative, oncological and functional outcomes. *Int J Urol.* 2020;27(3):194–205.
7. Cham A, Zeid M, Nabi N, David S, Jacob T, Abdelrahman M, et al. Robotic intracorporeal ileal conduit urinary diversion following robotic radical cystectomy: our experience. *Mesentery Peritoneum.* 2024;8:AB009.
8. Gill IS, Desai MM, Cacciamani GE, Khandekar A, Parekh DJ. Robotic radical cystectomy for bladder cancer: the way forward. *J Urol.* 2024;211(3):476–80.
9. Maibom SL, Joensen UN, Aasvang EK, Rohrsted M, Thind PO, Bagi P, et al. Robot-assisted laparoscopic radical cystectomy with intracorporeal ileal conduit diversion versus open radical cystectomy with ileal conduit for bladder cancer in an ERAS setup (BORARC): protocol for a single-centre, double-blinded, randomised feasibility study. *Pilot Feasibility Stud.* 2023;9(1):7.
10. Venkatramani V, Reis IM, Gonzalgo ML, Castle EP, Woods ME, Svatek RS, et al. Comparison of robot-assisted and open radical cystectomy in recovery of patient-reported and performance-related measures of independence: a secondary analysis of a randomized clinical trial. *JAMA Netw Open.* 2022; 5(2):e2148329.
11. İslamoğlu E, Anil H, Erol İ, Taş S, Ateş M, Savaş M. Robotic radical cystectomy for the management of bladder cancer: analysis of operative and pathological outcomes of eighteen patients. *Turk J Urol.* 2018;44(4):311–5.
12. Boğa MS, Özsoy Ç, Aktaş Y, Aydın A, Savaş M, Ateş M. Single-center experience of robot-assisted radical cystectomy (RARC) and extended pelvic lymph node dissection. *Turk J Urol.* 2020;46(4):288–96.

13. Murthy PB, Bryk DJ, Lee BH, Haber GP. Robotic radical cystectomy with intracorporeal urinary diversion: beyond the initial experience. *Transl Androl Urol*. 2020;9(2):942–8.
14. Chen G, Crivellaro S. Single-port robotic radical cystectomy with ileal conduit urinary diversion: technique and review of the early outcomes in literature. *Minim Invasive Surg*. 2021;5:54.
15. Lee M, Okoro C, Kuppa S, Eun D. Step-by-step robotic intracorporeal ileal conduit urinary diversion. *Urol Video J*. 2021;10:100081.
16. Guru KA, Perlmutter AE, Butt ZM, Piacente P, Wilding GE, Tan W, et al. The learning curve for robot-assisted radical cystectomy. *JSLs*. 2009;13(4):509–14.
17. Gaya JM, Uleri A, Sanz I, Basile G, Verri P, Hernandez P, et al. Robot-assisted radical cystectomy and ileal conduit with HugoTM RAS system: feasibility, setting and perioperative outcomes. *Int Braz J Urol*. 2023;49(6):787–8.
18. Mastroianni R, Tuderti G, Ferriero M, Anceschi U, Bove AM, Brassetti A, et al. Robot-assisted radical cystectomy with totally intracorporeal urinary diversion versus open radical cystectomy: 3-year outcomes from a randomised controlled trial. *Eur Urol*. 2024;85(5):422–30.
19. Liu H, Zhou Z, Yao H, et al. Robot-assisted radical cystectomy vs open radical cystectomy in patients with bladder cancer: a systematic review and meta-analysis of randomized controlled trials. *World J Surg Oncol*. 2023;21:240.
20. Devlin N, Pickard S, Busschbach J. The development of the EQ-5D-5L and its value sets. In: Devlin N, Roudijk B, Ludwig K, editors. *Value Sets for EQ-5D-5L: a compendium, comparative review & user guide*. Cham: Springer; 2022.
21. Nolan CM, Longworth L, Lord J, Canavan JL, Jones SE, Kon SS, et al. The EQ-5D-5L health status questionnaire in COPD: validity, responsiveness and minimum important difference. *Thorax*. 2016;71(6):493–500.
22. Bourke S, Bennett B, Oluboyede Y, Li T, Longworth L, O'Sullivan SB, et al. Estimating the minimally important difference for the EQ-5D-5L and EORTC QLQ-C30 in cancer. *Health Qual Life Outcomes*. 2024;22(1):81.
23. Pattanaphesaj J, Thavorncharoensap M, Ramos-Goni JM, Tongsiri S, Ingsrisawang L, Teerawattananon Y. The EQ-5D-5L valuation study in Thailand. *Expert Rev Pharmacoecon Outcomes Res*. 2018;18(5):551–8.
24. Kowalewski KF, Deininger M, Stüben G, Schmidt MW, Nickel F, Müller-Stich BP, et al. Assessment of patient selection and outcomes for robotic cystectomy: a multicenter experience. *Eur Urol Focus*. 2022;8(4):969–76.
25. Shabsigh A, Korets R, Vora KC, Brooks CM, Cronin AM, Savage C, et al. Variability in clinical selection criteria for robotic vs. open cystectomy. *J Urol*. 2020;203(1):123–30.
26. Li P, Meng C, Peng L, Gan L, Xie Y, Liu Y, Li Y. Perioperative comparison between robot-assisted and laparoscopic radical cystectomy: An update meta-analysis. *Asian J Surg*. 2023;46(9):3464–79.
27. Tan WS, Lamb B, Kelly JD, Fowler S, Nationwide Robotic Cystectomy Audit Group. Learning curve for robotic cystectomy and urinary diversion: results from a prospective multicenter study. *BJU Int*. 2019;123(1):89–97.
28. Dalimov Z, Reichard C, Espiritu PN, Shephard J, Lane BR. Postoperative renal function after robotic vs. open urinary diversions. *Urology*. 2023;171:139–46.
29. Lone Z, Hadjipavlou M, Sarpong R, Patel M, Gorin MA, Challacombe BJ, et al. Higher preoperative eGFR is a predictor of worse renal function decline after robotic-assisted radical cystectomy. *Urol Oncol*. 2022;40(5):301.e1–9.
30. Catto JWF, Khetrpal P, Ambler G, Taylor C, Jenkins C, Wadsworth R, et al. Effect of Robot-Assisted Radical Cystectomy With Intracorporeal Urinary Diversion vs Open Radical Cystectomy on 90-Day Morbidity and Mortality Among Patients With Bladder Cancer: A Randomized Clinical Trial. *JAMA*. 2022;327(1):49–59.
31. Hussein AA, Elsayed AS, Aldhaam NA, Jing Z, Raza SJ, May PR, et al. Comprehensive complication analysis after robot-assisted radical cystectomy: The Michigan Urological Surgery Improvement Collaborative (MUSIC) experience. *Eur Urol*. 2020;77(4):529–37.
32. Dagenais J, Lavallée LT, Jacobsen NE, Mallick R, Fairey AS, Lacombe L, et al. Patient-reported quality of life after radical cystectomy: implications for clinical care. *BJU Int*. 2022;130(3):312–20.
33. Neuzillet Y, Molinié V, Fournier G, Guy L, Cancel-Tassin G, Rouprêt M. Postoperative infectious complications and kidney function decline in major urological cancer surgery. *World J Urol*. 2023;41(1):45–52.
34. Pradere B, Rouprêt M, Yates DR, Bartoletti R, Kamat AM, Catto JW, et al. Infectious complications after radical cystectomy: incidence, risk factors and prevention. *Eur Urol*. 2021;79(5):659–68.
35. Long J, Wang L, Dong N, Bai X, Chen S, Sun S, Liang H, Lin Y. Robotic-assisted versus standard laparoscopic radical cystectomy in bladder cancer: A systematic review and meta-analysis. *Front Oncol*. 2022;12: 1024739.
36. Yang Z, Dou X, Zhou W, Liu Q. Robot-assisted, laparoscopic and open radical cystectomy for bladder cancer: A systematic review and network meta-analysis. *Int Braz J Urol*. 2024;50(6):683–702.