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BUCHAREST
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GENERAL SURGERY**

***COMPARATIVE STUDY ON THE OUTCOMES OF SIMPLE
DIRECT CUTANEOUS URETEROSTOMY VERSUS ILEAL
CONDUIT (NON-CONTINENT BRICKER) CUTANEOUS
URETEROSTOMY IN LOCALLY ADVANCED PELVIC
CANCER***

SUMMARY OF THE DOCTORAL THESIS

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List of Published Scientific Papers

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2. Radu CG, Rădăvoi GD, Aurelian J, Achim IF, Andraș I, Buzoianu M, et al. Quality of life analysis in patients with simple cutaneous ureterostomy versus Bricker ileal conduit following radical cystectomy. *Chirurgia (Bucur)*. 2025;120(2):205–217. DOI: 10.21614/chirurgia.3128
3. Radu CG, Rădăvoi GD, Aurelian J, Achim IF, Andras I, Buzoianu M, et al. 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. *Chirurgia (Bucur)*. 2025;120(4):446-458. DOI: 10.21614/chirurgia.3156

ABBREVIATIONS

ANOVA – Analysis of Variance
ASA – American Society of Anesthesiologists Score
CA-125 – Cancer Antigen 125
RARC – Robot-Assisted Radical Cystectomy
CRC – Colorectal Cancer
CRH – Corticotropin-Releasing Hormone
CRPC – Castration-Resistant Prostate Cancer
CT – Computed Tomography
DVC – Dorsal Venous Complex
DHT – Dihydrotestosterone
EAU – European Association of Urology
ECUD – Extracorporeal Urinary Diversion
EQ-5D-5L – EuroQol Five Dimensions, Five Levels Questionnaire
EORTC QLQ-C30 – European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire C30
TLPE – Total Laparoscopic Pelvic Exenteration
TPE – Total Pelvic Exenteration
FIGO – International Federation of Gynecology and Obstetrics
Hb – Hemoglobin
HRQoL – Health-Related Quality of Life
HSD – Honest Significant Difference
IBM – International Business Machines
ICUD – Intracorporeal Urinary Diversion
BMI – Body Mass Index
MRI – Magnetic Resonance Imaging
IQR – Interquartile Range
UTI – Urinary Tract Infection
JJ – JJ Ureteral Stent
LAPCa – Locally Advanced Prostate Cancer
NVB – Neurovascular Bundle
PET-CT – Positron Emission Tomography–Computed Tomography
IAP – Intra-Abdominal Pressure
PSA – Prostate-Specific Antigen
QALY – Quality-Adjusted Life Years
QoL – Quality of Life
QLQ-C30 – Quality of Life Questionnaire (EORTC Core QLQ-C30)
R0 – Complete Resection with Negative Margins
R1 – Incomplete Resection with Positive Margins
APR – Abdominoperineal Resection
GFR – Glomerular Filtration Rate
RAIR – Rectoanal Inhibitory Reflex
r-CUS – Retroperitoneal Cutaneous Ureterostomy
EAS – External Anal Sphincter
IAS – Internal Anal Sphincter
SCCA – Squamous Cell Carcinoma of the Anal Canal
SD – Standard Deviation
SPSS – Statistical Package for the Social Sciences

TTO – Time Trade-Off
TNM – Tumor–Node–Metastasis Classification
TURP – Transurethral Resection of the Prostate
t-CUS – Transperitoneal Cutaneous Ureterostomy
UC – Urothelial Carcinoma
CRCU – Complete Retroperitoneal Cutaneous Ureterostomy
SCU – Simple Cutaneous Ureterostomy
VAS – Visual Analogue Scale
VIP – Vasoactive Intestinal Peptide
VRAM – Vertical Rectus Abdominis Myocutaneous Flap
WHO – World Health Organization
XY – Male Karyotype

INTRODUCTION

Pelvic exenteration represents a radical surgical procedure indicated for locally advanced or recurrent pelvic neoplasms; however, domestic literature remains limited with regard to the comparative analysis of urinary diversions and minimally invasive surgical approaches. The therapeutic decision concerning the type of urinary reconstruction following exenteration is often empirical, being influenced by the team's experience and institutional resources. Clarifying the advantages and limitations of each method is essential for improving both prognosis and patient quality of life.

The aim of this research was to comparatively evaluate the impact of simple direct cutaneous ureterostomy (SCU) and non-continent ileal conduit (Bricker) diversion on postoperative complications and quality of life. The primary hypothesis assumed the existence of distinct clinical profiles associated with each method, influencing perioperative morbidity as well as functional autonomy at three months. A secondary hypothesis considered the role of the surgical approach (open, laparoscopic, robotic) in performing the Bricker diversion and its impact on recovery.

The main objectives included: evaluation of peri- and postoperative complications according to the type of urinary diversion; assessment of quality of life at three months using EQ-5D-5L and EQ-VAS; identification of clinical factors that may guide the selection of the optimal reconstructive method, comparison of surgical approaches for the Bricker diversion and integration of multicenter experience to obtain nationally relevant comparative data.

The study included patients older than 18 years, diagnosed with advanced or recurrent pelvic malignancies, who underwent total or anterior pelvic exenteration requiring permanent urinary diversion (SCU by open approach, or Bricker diversion performed through open, laparoscopic, or robotic techniques). Exclusion criteria were early postoperative mortality, severe neurological or psychiatric disorders, incomplete data, alternative types of urinary reconstruction, and refusal to participate. Data were collected retrospectively from medical records, operative protocols and oncological registries of five medical centers in Romania. Demographic variables, pre- and postoperative biological parameters, surgical characteristics, immediate and late complications, length of hospitalization and adjuvant oncological treatments were analyzed. Quality of life at three months was assessed using EQ-5D-5L and EQ-VAS.

This observational, retrospective, multicenter study, conducted between March 2020 and March 2025 across five Romanian centers, included 102 patients who underwent pelvic exenteration. Urinary reconstruction was achieved either by simple cutaneous ureterostomy (SCU, n=44) or by non-continent ileal conduit (Bricker, n=58), performed via open, laparoscopic, or robotic approaches.

Comparative analysis revealed significant differences between the two reconstructive methods. The Bricker technique was associated with longer operative time and greater blood loss, yet with shorter hospital stays and lower incidence of sepsis. Conversely, non-specific surgical complications (ileus, wound infections) were more frequently observed in the Bricker group. Renal function at three months was comparable between groups. Quality of life assessment using EQ-5D-5L and EQ-VAS demonstrated similar global scores; however, patients with Bricker diversion showed superior autonomy in self-care and daily activities domains, attributable to the simpler management of a single stoma.

Comparison of surgical approaches for Bricker diversion indicated that the robotic technique was associated with reduced blood loss, faster recovery and superior quality of life scores, while the laparoscopic approach showed the highest rate of non-specific complications, likely related to technical challenges and the learning curve. The analysis also highlighted a tendency to allocate SCU to more fragile patients, whereas Bricker diversion was preferred in those with a more favorable clinical profile.

Although this study provides a valuable national perspective on current practices, methodological limitations—retrospective design, lack of randomization, unequal subgroup distribution and short follow-up period—warrant cautious interpretation of results. Prospective, multicenter studies with long-term follow-up, as well as comprehensive assessments of psychosocial dimensions and cost-effectiveness, are needed. Furthermore, the development of personalized decision-making algorithms and standardized perioperative care protocols may contribute to optimizing urinary reconstructive management following pelvic exenteration.

GENERAL PART

In **the first chapter** of the general section, the anatomy and physiology of the pelvic viscera with direct relevance for surgical, oncological, and functional practice are synthesized. The structure of the urinary bladder and its anatomical relationships are described, including wall stratification and the vascular, lymphatic and neural networks involved in continence and micturition, alongside the course of the ureters with their segmental vascularization and the role of the ureterovesical junction in preventing reflux [1–7,11–16]. Control of the lower urinary tract is presented through medullary and pontine networks, including Barrington's nucleus and the modulation of CRH in the context of the stress response [8–10]. The morphology of the male and female urethra is detailed, along with the regional features of the prostate and its androgen-dependent physiology (the role of DHT, PSA dynamics, and their clinical significance) [18,19,23–27,30]. The contribution of the seminal vesicles to the volume and biochemistry of seminal fluid and the integration of the hypothalamic–pituitary–gonadal axis in the regulation of male reproductive function are correlated with clinical implications for fertility [31–34].

From a gynecological perspective, the chapter describes the ligamentous support, vascularization, and lymphatic drainage of the ovaries and uterus; the cyclic dynamics of the endometrium (proliferation–secretion–desquamation, scar-free regeneration); myometrial contractility and cervical mechanisms involved in maintaining pregnancy; as well as the synchronization of tubal transport of gametes/embryo via ciliary beating, peristalsis, and tubal flow under autonomic and hormonal control [35–38,40–45,49–56].

The pelviperineal component is completed by the anatomy of the vagina and vulva (vascular and neural networks, hormone-dependent trophic variability, and the role of clitoral/vestibular erectile tissue), the organization of the anorectal complex (anorectal ring, IAS/EAS, pectinate line, porto-systemic venous pathways, and divergent lymphatic drainage), and the physiology of continence and defecation (RAIR, the role of the puborectalis muscle and pelvic diaphragm) [57–68,69–76,78–83]. In addition, the chapter defines the particularities of the sigmoid colon (mesosigmoid, marginal artery, lymphatic pathways) and the ileum (ileocecal valve, mesenteric arcades, neuro-myogenic control of motility), with emphasis on hydro-electrolytic absorption, motor patterns (segmentation, mass movements, migrating motor complex), and the

hypothesis of the rectosigmoid barrier in maintaining continence [84–92,88,89]. Through this synthesis, the chapter provides a surgical map of the pelvis and correlates the dissectible fascial planes (Denonvilliers' fascia, rectal proper fascia, mesorectum), the “critical” vascular and neural relationships (e.g., “ureter under the uterine artery,” prostatic NVBs, inferior hypogastric plexus), and reflex mechanisms conditioning postoperative functional outcomes, thereby laying the foundation for the technical approaches and analysis of results presented in subsequent chapters [1,5,42,72].

The second chapter synthesizes the indications and outcomes of pelvic exenteration in pelvic neoplasms, with the primary objective of achieving negative margins (R0) and strict multidisciplinary selection. In colorectal cancer, TPE is a curative option for locally advanced or recurrent disease, with a mortality of <2% and major complication rates of ~30%, the approach being guided by TNM staging, risk profile, and quality-of-life impact [93–97,94–95,97]. For locally advanced/recurrent rectal cancer, TPE can achieve 5-year survival rates of up to 66% in dedicated centers; the pattern of extension (anterior/posterior/lateral) defines resectability, with evaluation integrating medical history, clinical examination, pelvic MRI, thoraco-abdominal CT, and colonoscopy; neoadjuvant treatment and minimally invasive approaches (including robotic) achieve comparable R0 rates, with a tendency to reduce anastomotic complications [98–102,88]. In advanced anal carcinoma, MRI is mandatory, metastases occur in 10–20%, and salvage resections (APR, selected exenterations) remain options in carefully selected cases [103–106].

In advanced ovarian neoplasms, the primary goal remains pelvic “en bloc” cytoreduction to R0, with the particularity of peritoneal dissemination allowing for extensive maneuvers; patient selection for minimally invasive approaches is based on clinical/imaging regression and biological markers [107–112]. For cervical cancer, FIGO staging is considered in treatment planning; exenteration is reserved for persistent disease or recurrence after radiochemotherapy, with variable morbidity and prognosis determined by histopathological factors [113–117]. In endometrial cancer, strategy is individualized, with curative surgery pursued only if R0 is feasible, while minimally invasive approaches represent the standard for operable disease [118–120]. Rare but advanced vaginal/vulvar tumors may require anterior pelvectomy/vaginectomy and reconstruction (VRAM flap), with functional benefits despite significant morbidity [121–130,125]. In urological oncology, the “nested” variant of urothelial carcinoma exhibits aggressive behavior; radical cystectomy with lymphadenectomy and tailored urinary diversion is the standard, followed by

imaging surveillance and monitoring of late metabolic complications [131–136]. For locally advanced prostate cancer/CRPC with severe symptomatology, exenteration may have curative or palliative indications, with robotic approaches offering perioperative advantages over open surgery [137–141].

The third chapter presents pelvic exenteration as a radical intervention with curative intent for subgroups of locally advanced/recurrent pelvic tumors and details its evolution from Brunschwig's classical description to extensive "en bloc" resections extending to the pelvic wall and perineal reconstructions, with the constant objective of achieving R0 margins [93,142,133,143]. The chapter systematizes the anatomic-functional types (anterior, posterior, total) and the classification by levels (Type I supralelevator, Type II infralevator with levator resection, Type III infralevator with vulvectomy), including the possibility of parietal resections (iliac vessels, lateral pelvic floor) in extensive disease [144,145]. Indications mainly include locally advanced/recurrent colorectal cancer, but also selected gynecologic and urologic neoplasms, with strict selection (tumors <30 mm, negative margins, no evident metastases), as well as palliative situations for controlling severe complications (obstruction, fistulae, hemorrhage, infections) [145,146,142]. Contraindications are specified (distant metastases, major bony/vascular invasion, extensive lateral pelvic floor involvement, intraperitoneal dissemination; negative factors such as high BMI, nodal disease, extensive lateral invasion, ASA IV–V status), along with principles of reconstruction of the urinary, digestive, and genital tracts, including continent/incontinent diversions and the use of myocutaneous flaps [146,147,142]. The surgical approaches are compared: open, with notable complication profiles (pelvic, urinary, fistulae, hemorrhages) and transient quality-of-life impact (initial decline in physical/role/social functions, with partial recovery at 3–6 months) [148–150]; laparoscopic (TLPE)—feasible in experienced centers, with standardized steps, Lloyd-Davies positioning, five trocars, and clear staging of resection and diversions—demonstrating safety in gynecologic, urologic, and colorectal pathologies [151–155]; and robotic (3D visualization, articulated instruments, superior ergonomics), particularly useful in obese or irradiated patients, with integrated technical steps (ICG for perfusion, robotic stapling) and perioperative benefits, but associated with higher costs/learning curve and still-maturing evidence on R0 and long-term survival [144,156–158].

The fourth chapter describes urinary diversions performed after radical cystectomy for muscle-invasive bladder cancer, classifying them by continence and highlighting their clinical,

metabolic, and quality-of-life implications. Major types of continent diversions are presented (Indiana, Mitrofanoff, Mainz II/III, Kock, Florida, Miami), as well as orthotopic ileal neobladder (Studer, Hautmann, Padua, Camey), summarizing technique, indications, functional benefits, and early and late complications [159–165]. Non-continent diversions are detailed through the options of direct cutaneous ureterostomy (open, laparoscopic, robotic) and the Bricker ileal conduit, the latter representing the current standard, both via open and minimally invasive approaches (laparoscopic extracorporeal/intracorporeal, robotic-assisted), with emphasis on surgical technique, patient selection, and complications [166–183].

The fifth chapter is dedicated to the analysis of health-related quality of life (HRQoL) in oncological patients following radical cystectomy and pelvic exenteration. Standardized assessment tools, EQ-5D-5L and EORTC QLQ-C30, are presented, along with their advantages and limitations, as well as the use of the QALY indicator in cost-effectiveness analyses [184–188]. The chapter emphasizes the particularities of HRQoL in locally advanced or recurrent pelvic cancer, where, despite the invasiveness of pelvic exenteration, patients relatively quickly regain functional capacity and quality-of-life status, with improvements in postoperative reported scores [189–191]. Psychosocial and physical aspects are discussed, including body image, social and sexual function, highlighting the impact of stoma and complications on recovery. Furthermore, differences in HRQoL among various gynecologic and colorectal neoplasms are analyzed. In cervical cancer, quality-of-life decline is influenced by symptom burden, multimodal treatment side effects, and psychological impact [192]; in endometrial cancer, favorable prognosis correlates with better outcomes, although adjuvant therapies significantly reduce HRQoL [193]; and in advanced colorectal cancer, patients report lower values compared to the general population [194].

PERSONAL CONTRIBUTION

6. Working Hypothesis and General Objectives

6.1. Working Hypothesis

Total pelvic exenteration, indicated for locally advanced or recurrent pelvic cancers, involves en bloc resection of the affected organs with curative or palliative intent, requiring permanent urinary diversion. The choice of diversion type—simple cutaneous ureterostomy (SCU) or Bricker ileal conduit, performed through open, laparoscopic, or robotic approach—directly influences morbidity, complications and postoperative quality of life. The hypothesis of this thesis is that each method presents specific advantages and limitations, whose comparative evaluation enables personalized surgical decision-making according to patient profile, disease extent, available resources and the experience of the multidisciplinary team.

6.2. General Objectives

1. To comparatively evaluate peri- and postoperative complications in patients undergoing pelvic exenteration for locally advanced pelvic cancers, according to the type of urinary diversion—simple direct cutaneous ureterostomy (SCU) versus non-continent ileal conduit (Bricker)—performed through open, laparoscopic, or robotic approaches.
2. To analyze the impact of the diversion method on postoperative quality of life, using the EQ-5D-5L questionnaire and the EQ-VAS visual analogue scale at 3 months after surgery.
3. To determine the optimal patient profile and propose a personalized algorithm for selecting the urinary diversion method, integrating clinical, anatomical and functional factors.
4. To compare Bricker techniques (open, laparoscopic, robotic) with respect to clinical outcomes, operative time, complications and functional recovery, reflecting the progressive adoption of minimally invasive surgery in pelvic oncology.
5. To capitalize on multicentric data collected from five Romanian centers between March 2020 and March 2025, providing a national perspective on oncological surgical practice and contributing to the development of potential strategies for optimizing therapeutic management.

7. General Research Methodology

This research is a retrospective, observational, multicenter study that comparatively evaluated clinical outcomes and quality of life in patients with locally advanced or recurrent pelvic cancer who underwent pelvic exenteration with urinary diversion by simple cutaneous ureterostomy (SCU) or non-continent Bricker ileal conduit, performed through open, laparoscopic, or robotic approaches.

The study included consecutive patients operated on between March 2020 and March 2025 in five Romanian medical centers: Prof. Dr. Theodor Burghele Clinical Hospital Bucharest, Sfânta Maria Clinical Hospital Bucharest, Cluj-Napoca Municipal Clinical Hospital, Medicover Hospital Cluj and Regina Maria Hospital Cluj.

Inclusion criteria were histologically confirmed pelvic cancer, indication for exenteration (anterior, posterior, or total), age ≥ 18 years, availability for quality-of-life evaluation at 3 months and performance of SCU or Bricker diversion. Exclusion criteria included early postoperative death, severe cognitive disorders, incomplete data, or other types of urinary diversions.

The main indications for surgery were muscle-invasive bladder tumors, locally advanced rectosigmoid tumors and advanced or recurrent gynecologic neoplasms, with predominance of bladder tumors (85.3%), followed by rectosigmoid (5.9%), cervical (4.9%), vulvar (2.9%) and vaginal tumors (1%). Out of 113 initially eligible patients, 102 were included in the analysis: 44 SCU and 58 Bricker (18 open, 22 laparoscopic, 18 robotic).

Collected data included demographic, biological, peri- and postoperative parameters, operative and hospitalization duration, early and late complications, oncological stage and adjuvant treatment. HRQoL was assessed at 3 months postoperatively by EQ-5D-5L and EQ-VAS, with each patient assigned a numerical profile across five dimensions, while the VAS score reflected global subjective perception of health status.

The study complied with the principles of the Declaration of Helsinki and was approved by the ethics committees of the participating centers, with informed consent obtained from all patients.

Statistical analysis was performed using IBM SPSS Statistics 25 and complementary Excel/Word tools. The distribution of quantitative variables was evaluated by the Shapiro–Wilk test, parametric variables expressed as mean $\pm$ SD and nonparametric variables as median (IQR).

Comparisons between two groups were performed using Student's t-test or Mann–Whitney U test, while comparisons among more than two groups were performed using ANOVA/Welch ANOVA or Kruskal–Wallis H test with appropriate post-hoc tests. Correlations were analyzed by Pearson or Spearman's Rho coefficients, paired variables by Paired Samples t-test and categorical variables by Fisher's Exact Test, with a significance level of $\alpha = 0.05$ and two-tailed testing.

8. Comparative Analysis of Pre- and Postoperative Complications Associated with Simple Cutaneous Ureterostomy and Ileal Conduit (Bricker) Diversion in Patients Undergoing Pelvic Exenteration

8.1 Introduction

Pelvic exenteration, initially described by Brunschwig in 1948 for recurrent cervical carcinomas, subsequently became a standard procedure for locally advanced or recurrent pelvic tumors, including colorectal and urological malignancies [153,195,196]. The intervention involves en bloc resection of pelvic organs and lymph nodes through anterior, posterior, or total approaches. The selection of urinary diversion type—simple cutaneous ureterostomy (SCU) or Bricker ileal conduit—depends on the patient's clinical status, tumor extension, and prognosis [197–205].

The SCU technique is characterized by shorter operative time and hospitalization, as well as simpler stoma management, but is associated with a higher risk of urinary tract infections, fistulae, or ureteral necrosis. In contrast, the Bricker technique carries specific metabolic risks and anastomotic complications, yet allows easier access for subsequent interventions [202–207]. The choice of diversion method must be individualized and adapted to the surgical team's expertise within a specialized oncological setting, where achievement of R0 resection is correlated with improved survival [196,209,210].

The hypothesis of this study is that the type of urinary diversion significantly influences peri- and postoperative morbidity, and that these differences can be systematically analyzed in a multicenter framework. The objective of the research is to comparatively evaluate complications associated with SCU and Bricker diversions, including incidence, severity, and correlations with biological parameters, renal function, ureteral stent use, operative time and hospitalization, urinary tract infections, tumor staging, and adjuvant treatments.

8.2 Materials and Methods

This retrospective study aimed to compare peri- and postoperative complications in patients undergoing pelvic exenteration, according to the type of urinary diversion performed: simple cutaneous ureterostomy (SCU) by open approach and non-continent Bricker ileal conduit performed via open, laparoscopic, or robotic approach. The final cohort included 102 patients, of whom 44 underwent SCU and 58 Bricker diversion, allowing for a comprehensive comparative evaluation between the two techniques.

For each patient, relevant clinical data were collected, including renal function estimated by glomerular filtration rate, hemoglobin levels, history and incidence of urinary tract infections, use of ureteral stents, operative time and length of hospitalization, postoperative complications, adjuvant therapies, and pre- and postoperative tumor staging.

Data analysis was performed using IBM SPSS Statistics 25, applying parametric and non-parametric tests appropriate to the type and distribution of variables. The threshold for statistical significance was set at $p < 0.05$, with all tests being two-tailed.

8.3 Results

Demographic analysis of the patient cohort revealed comparable mean ages between groups: 64.57 ± 9.66 years in the Bricker group and 64.84 ± 9.61 years in the SCU group, with no statistically significant difference ($p = 0.898$, Table 8.1). Sex distribution was balanced in the SCU group (50% male/female), whereas in the Bricker group the majority of patients were male (74.1%), representing a statistically significant difference ($p = 0.014$, Figure 8.1).

Table 8.1. Comparison of Patient Age According to Type of Urinary Diversion

Diversion Type	Mean $\pm$ SD, years	Median (IQR), years	p-value
Bricker	64.57 ± 9.66	66 (60-71.25)	0.898
SCU	64.84 ± 9.61	67.5 (58.75-70)	

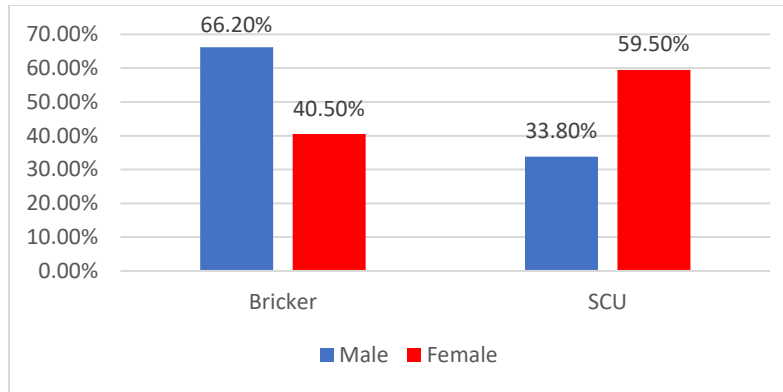


Figure 8.1. Distribution of Patients According to Gender and Type of Urinary Diversion

Preoperative renal function, assessed by glomerular filtration rate (GFR), was slightly more favorable in the Bricker group (72.43 ± 25.86 ml/min/1.73 m²) compared to SCU (63.31 ± 22.71 ml/min/1.73 m²), although not statistically significant ($p = 0.066$). Postoperative GFR values remained comparable between groups (Bricker: 74.92 ± 24.7 ; SCU: 67.95 ± 25.36 ; $p = 0.172$), suggesting short-term preservation of renal function in both techniques (Table 8.2).

Table 8.2. Comparison of Preoperative and Postoperative GFR According to Type of Diversion

Diversion Type	Mean ± SD, ml/min/1.73 m²	Median (IQR), ml/min/1.73 m²	p value
Preoperative GFR			
Bricker	72.43 ± 25.86	73.5 (52.75-94.5)	0.066
SCU	63.31 ± 22.71	60.5 (45.25-79.21)	
Postoperative GFR			
Bricker	74.92 ± 24.7	74.5 (56.75-92.75)	0.172
SCU	67.95 ± 25.36	61 (50-89.75)	

Preoperative hematologic status was more favorable in the Bricker group (Hb = 12.56 ± 1.56 g/dL) compared to SCU (11.78 ± 1.58 g/dL, $p = 0.014$). Postoperative hemoglobin decline was more pronounced in Bricker patients (-2.24 ± 1.15 vs. -1.65 ± 0.9 g/dL; $p = 0.007$, Table 8.4), suggesting greater intraoperative blood loss associated with the complexity of the Bricker technique.

Table 8.4. Comparison of Preoperative and Postoperative Hemoglobin According to Type of Diversion

Diversion Type	Diversion Type	Diversion Type	Diversion Type
Preoperative Hb			
Bricker	12.56 ± 1.56	12.3 (11.3-13.72)	0.014
SCU	11.78 ± 1.58	11.7 (10.72-13.1)	
Postoperative Hb			
Bricker	10.32 ± 1.31	10.35 (9.37-11.2)	0.472
SCU	10.12 ± 1.37	10.05 (9.1-11.22)	

Operative time was significantly longer in the Bricker group (436.55 ± 98.96 minutes) compared to SCU (397.5 ± 101.65 minutes; $p = 0.023$, Table 8.6), reflecting the higher complexity of the ileal technique. In contrast, **length of hospital stay** was longer in SCU patients (19 ± 10.96 days vs. 11.36 ± 6.11 days; $p < 0.001$, Table 8.7), likely reflecting the selection of patients with a more compromised general status. A significant positive correlation between operative time and hospitalization length was observed in both groups (Bricker: $R = 0.366$, $p = 0.005$; SCU: $R = 0.406$, $p = 0.006$, Figure 8.2).

Table 8.7. Comparison of Hospitalization Length According to Type of Diversion

Diversion Type	Diversion Type	Diversion Type	Diversion Type	Diversion Type
Bricker	11.36 ± 6.11	10 (7-13.25)	38.16	<0.001
SCU	19 ± 10.96	15.5 (13.25-22.5)	69.08	

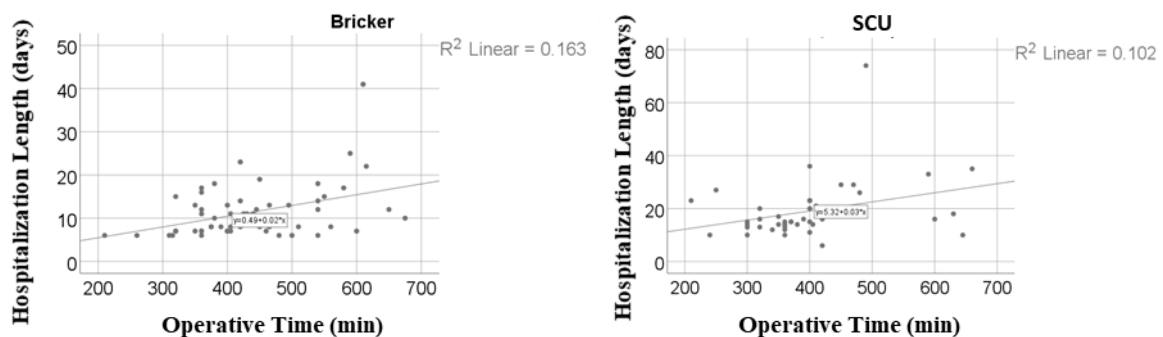


Figure 8.2. Correlation Between Operative Time and Hospitalization Length

Preoperative GFR and hemoglobin values were positively correlated, more strongly in the Bricker group ($R = 0.608$, $p < 0.001$) than in SCU ($R = 0.431$, $p = 0.004$), indicating a more favorable functional and hematologic profile in patients selected for Bricker. Postoperatively, the correlation between GFR and hemoglobin remained significant only in the Bricker group ($R = 0.382$, $p = 0.003$).

Postoperative complications differed notably between groups. Sepsis was more frequent in SCU patients (13.6% vs. 1.7%, $p = 0.041$), while other general complications (intestinal/urinary fistulae, eviscerations, non-specific complications) were more common in Bricker patients (24.1% vs. 6.8%, $p = 0.030$, Table 8.11). Postoperative ileus was observed exclusively in the Bricker group (8.6%), with a trend toward significance ($p = 0.068$). Other events, such as wound infection/dehiscence or hydronephrosis, showed no significant differences.

Preoperative tumor staging (T) was balanced across groups, whereas tumor grading (G) differed significantly ($p = 0.017$), with G1 tumors more frequently treated with SCU. No significant differences were noted postoperatively. Adjuvant treatment was administered equally across groups (26.5% overall, $p = 0.366$, Table 8.11).

Table 8.11. Patient Characteristics According to Type of Urinary Diversion

Parameter (N, %)	Total	Bricker	SCU	p value
N, %	100	56.9	43.1	–
Postoperative UTI, %	10.8	10.3	11.4	1.000
Wound infection and dehiscence, %	3.9	6.9	0	0.132
Ileus, %	4.9	8.6	0	0.068
Pyelonephritis, %	8.8	8.6	9.1	1.000
Sepsis, %	6.9	1.7	13.6	0.041
Hydronephrosis, %	2.9	3.4	2.3	1.000
Wound seroma, %	2.9	1.7	4.5	0.576
Pelvic abscess, %	3.9	1.7	6.8	0.313
Other complications, %	16.7	24.1	6.8	0.030
Adjuvant therapy, %	26.5	22.4	31.8	0.366
Preoperative Tumor Staging (T)				
Tis, %	2.9	5.2	0	0.429
T1, %	26.5	29.3	22.7	
T2, %	58.8	51.7	68.2	
T3, %	8.8	10.3	6.8	
T4, %	2.9	3.4	2.3	

Preoperative Tumor Grading (G)				
G1, %	17.6	12.1	25	0.017
G2, %	6.9	12.1	0	
G3, %	74.5	74.1	75	
G4, %	1	1.7	0	
Postoperative Tumor Staging (T)				
Tis, %	3.9	6.9	0	0.383
Tx, %	3.9	5.2	2.3	
T1, %	15.7	19	11.4	
T2, %	25.5	24.1	27.3	
T3, %	36.5	31	43.2	
T4, %	14.7	13.8	15.9	
Postoperative Tumor Grading (G)				
G1, %	72.5	70.7	75	0.439
G2, %	2.9	5.2	0	
G3, %	24.5	24.1	25	

8.4 Discussion

The comparative analysis highlighted significant differences between Bricker ileal conduit diversion and simple cutaneous ureterostomy (SCU) regarding perioperative parameters and postoperative outcomes. SCU was associated with shorter operative time, reduced blood loss, and a lower risk of major gastrointestinal complications, making it a more suitable option for fragile or elderly patients [212,213]. The mean operative duration was significantly longer in the Bricker group compared to SCU ($p = 0.023$), while hospitalization was significantly prolonged in the SCU group ($p < 0.001$) [212,214].

Renal function, assessed by glomerular filtration rate (GFR), did not differ significantly between the two techniques, both preoperatively and postoperatively ($p > 0.05$), suggesting that either method can maintain short-term renal stability, particularly when ureteral stenting is used in SCU patients [205]. Preoperative hemoglobin levels were higher in the Bricker group ($p = 0.014$), while postoperative decreases were more pronounced in these patients ($p = 0.007$), reflecting greater surgical trauma and intraoperative blood loss associated with ileal diversion [212].

Postoperative complications also showed distinct patterns. Sepsis was more frequent in the SCU group (13.6% vs. 1.7%, $p = 0.041$), whereas ileus and wound-related complications were more common in the Bricker group. Other adverse events, such as urinary tract infections, hydronephrosis, or pelvic abscesses, did not differ significantly between the groups [205,210].

Tumor staging and histopathological grading distributions were broadly comparable between the groups, indicating balanced selection of patients for each urinary diversion type. Adjuvant therapy administration was similar (22.4% Bricker vs. 31.8% SCU, $p = 0.366$), showing no significant influence on the choice of technique [219].

Statistical correlations revealed significant associations between operative duration and length of hospitalization, as well as between preoperative hemoglobin and renal function, underscoring the importance of careful preoperative evaluation in therapeutic decision-making [212,214,215–217].

8.5 Conclusions

This multicenter retrospective study, including 102 patients who underwent pelvic exenteration, compared simple cutaneous ureterostomy (SCU) with the non-continent ileal conduit (Bricker). The Bricker technique was associated with longer operative time, greater postoperative hemoglobin decline, and nonspecific surgical complications—including ileus and wound infections/dehiscence—reflecting its higher technical complexity and increased intraoperative blood loss. SCU was characterized by shorter operative time, longer hospitalization, and a higher incidence of sepsis, suggesting a more fragile preoperative profile of patients undergoing this diversion.

Postoperative renal function remained stable in both groups, while correlations between hemoglobin and GFR indicated that patient selection was influenced by biological status. The incidence of urinary tract infections was affected by the duration of ureteral stenting and the type of urinary diversion. Tumor staging and histopathological grading were broadly comparable, although SCU was more frequently associated with well-differentiated tumors preoperatively.

9. Impact of Urinary Diversion Type on Pre- and Postoperative Complications and Quality of Life at Three Months Following Pelvic Exenteration: A Comparison Between Bricker Ileal Conduit and Simple Cutaneous Ureterostomy in the Context of the Open Approach

9.1 Introduction

Pelvic exenteration is a radical surgical intervention indicated for locally advanced or recurrent pelvic malignancies without distant metastases, with the primary objective of achieving an R0 resection and offering significant oncological benefits in carefully selected patients [220–223]. Regarding urinary diversion, the main options include simple cutaneous ureterostomy (SCU) and the Bricker ileal conduit. SCU is technically less demanding, associated with shorter operative time, reduced hospitalization, and lower incidence of early complications, and is therefore preferred in patients with poor general condition [224–226]. However, this technique carries a higher risk of late complications, such as stomal stenosis or recurrent pyelonephritis, and often requires long-term ureteral stenting [225]. The ileal conduit, although associated with longer operative time and higher perioperative risk, offers superior outcomes in terms of physical condition and renal function preservation [214,225,235]. Quality of life (QoL), defined by the World Health Organization as the individual's perception of their existence in relation to cultural context, personal values, and goals [227,228], is essential in evaluating postoperative outcomes. Validated instruments such as EQ-5D-3L and EQ-5D-5L, together with the Visual Analogue Scale (EQ-VAS), are widely used for multidimensional assessment of functional status, including mobility, self-care, usual activities, pain/discomfort and emotional state [229–233]. The EQ-5D-5L version demonstrates higher sensitivity, particularly in detecting functional limitations in elderly patients [233]. Although both types of urinary diversion initially impair body image and sexual function, most patients experience gradual improvement in QoL within the first six postoperative months, while persistent difficulties may occur in daily activities, along with fatigue or chronic pain [214,222,234].

The primary objective of this study is to compare quality of life at three months postoperatively in patients undergoing pelvic exenteration with Bricker ileal conduit (open approach) versus SCU (open approach), using EQ-5D-5L and EQ-VAS scores. Secondary

objectives include analysis of functional dimension differences as assessed by EQ-5D-5L, evaluation of global health perception through EQ-VAS, and correlation of postoperative complications with QoL scores. The results are interpreted in relation to those of Study 1, which analyzed complications associated with different urinary diversion techniques (SCU vs. Bricker) and surgical approaches (open, laparoscopic, robotic).

9.2 Materials and Methods

This study compared quality of life at three months postoperatively in patients undergoing pelvic exenteration with urinary diversion by Bricker ileal conduit (open approach) or SCU. A total of 62 patients were included (18 Bricker, 44 SCU), with exclusion of early deaths, patients with severe neurological or psychiatric disorders, and incomplete questionnaires. Quality of life was assessed using EQ-5D-5L and EQ-VAS. Additional clinical parameters and postoperative complications were also analyzed, including hemoglobin, glomerular filtration rate (GFR), urinary tract infections, wound dehiscence, pyelonephritis, sepsis, and hydronephrosis. Comparisons of EQ-5D-5L and EQ-VAS scores between groups were performed using parametric and nonparametric tests, while categorical variables were analyzed using chi-square or Fisher's exact test ($p < 0.05$).

9.3 Results

As shown in Table 9.1, mobility and the dimensions of pain/discomfort and anxiety/depression were similar between the two groups, with no statistically significant differences ($p > 0.05$). In contrast, self-care and usual activities scores were significantly higher in the Bricker group ($p = 0.030$ and $p = 0.036$, respectively). These findings suggest better functional autonomy and an enhanced capacity for social reintegration in patients with Bricker diversion, despite a more complex oncological profile.

Tabel 9.1 Comparison of EQ-5D-5L Dimension Scores According to Type of Urinary Diversion

Dimension	Diversion	Mean $\pm$ SD	Median (IQR)	Mean Rank	p value
<i>Mobility</i>	Bricker	2.33 $\pm$ 1.23	2 (1-3)	33.58	0.537
	SCU	2.23 $\pm$ 1.5	1 (1-4)	30.65	
<i>Self-care</i>	Bricker	3.06 $\pm$ 1.35	3 (2-4)	38.94	0.030
	SCU	2.27 $\pm$ 1.57	1 (1-4)	28.45	

<i>Usual activities</i>	Bricker	3.56 ± 1.46	4 (2-5)	38.83	0.036
	SCU	2.66 ± 1.49	2.5 (1-4)	28.50	
<i>Pain</i>	Bricker	2.83 ± 1.25	3 (2-4)	33.89	0.494
	SCU	2.64 ± 1.4	2 (1.25-4)	30.52	
<i>Anxiety / depression</i>	Bricker	2.28 ± 1.27	2 (1-3)	29.64	0.588
	SCU	2.61 ± 1.66	2 (1-4.75)	32.26	

Analysis of overall quality-of-life scores (Table 9.2) revealed higher mean values for the total EQ-5D-5L score in the Bricker group (14.06 ± 5.18) compared to SCU (12.41 ± 6.76), although the difference did not reach statistical significance ($p = 0.184$). Similarly, EQ-5D-5L utility scores and EQ-VAS scores showed no significant differences between groups, indicating a comparable global perception of health status at three months postoperatively.

Tabel 9.2 Comparison of Total EQ-5D-5L Score, EQ-5D-5L Utility Score, and EQ-VAS Score According to Type of Urinary Diversion

Score	Diversion	Mean ± SD	Median (IQR)	Mean Rank	p value
<i>Total EQ-5D-5L Score</i>	Bricker	14.06 ± 5.18	14.5 (8.75-18.25)	36.25	0.184
	SCU	12.41 ± 6.76	9.5 (7-19.75)	29.56	
<i>EQ-5D-5L Utility Score</i>	Bricker	0.49 ± 0.27	0.46 (0.27-0.74)	26.67	0.177
	SCU	0.58 ± 0.37	0.74 (0.18-0.89)	33.48	
<i>EQ-VAS Score</i>	Bricker	70 ± 18.55	72.5 (58.75-81.25)	29.92	0.656
	SCU	70.11 ± 22.03	77.5 (52.5-85)	32.15	

Wound infection and dehiscence were reported exclusively in Bricker patients (11.1%), with a trend toward statistical significance ($p = 0.081$), whereas pyelonephritis and urinary tract infections were more frequent in the SCU group, without significant differences. Preoperative use of JJ stents was significantly higher in the Bricker group ($p = 0.022$), reflecting the greater complexity of cases. Histopathological analysis revealed significant differences between groups: grade G1 tumors were more common in SCU, whereas Bricker patients exhibited a higher proportion of G2–G3 tumors, with differences reaching statistical significance both preoperatively ($p = 0.043$) and postoperatively ($p = 0.001$).

9.4 Discussion

Evaluation using the EQ-5D-5L and EQ-VAS questionnaires did not reveal statistically significant differences between patients with Bricker ileal conduit and those with simple cutaneous ureterostomy (SCU) in terms of overall health scores. However, functional differences were noted across specific dimensions. Patients with Bricker diversion demonstrated superior functional autonomy, reflected in significantly higher scores for self-care (3.06 ± 1.35 vs. 2.27 ± 1.57 ; $p = 0.030$) and resumption of daily activities (3.56 ± 1.46 vs. 2.66 ± 1.49 ; $p = 0.036$). Mobility, pain/discomfort, and psychological status (anxiety/depression) were comparable between the groups. These results are consistent with findings in the literature, which describe functional advantages and higher satisfaction levels in patients with ileal conduit diversion [225,235]. The similar scores for pain/discomfort and anxiety/depression suggest that immediate emotional impact and early pain-related symptoms are primarily influenced by the severity of the oncological disease and the postoperative recovery process [227,236]. Analysis of postoperative complications highlighted distinct trends: urinary tract infections and sepsis were more common in the SCU group, whereas wound infection and dehiscence were observed more frequently in the Bricker cohort. Renal function was numerically superior in the Bricker group, correlating with the lower risk of ascending infections and aligning with literature indicating a more pronounced decline in GFR among SCU patients [235]. Additionally, Bricker patients presented with more advanced tumor grade and stage, suggesting that this technique was preferentially employed in cases with a more complex oncological profile. The study's limitations include the absence of randomization, the relatively small size of the Bricker cohort, and the short follow-up period of three months, which precludes comprehensive assessment of long-term adaptation and late complications [225,235]

9.5 Conclusions

This retrospective observational study compared quality of life at three months after pelvic exenteration between patients with Bricker ileal conduit and those with simple cutaneous ureterostomy (SCU), using EQ-5D-5L and EQ-VAS instruments. The findings demonstrated superior functional autonomy in the Bricker group (self-care and daily activities), despite a higher incidence of postoperative complications and a more advanced tumor profile. Overall quality-of-life scores did not differ significantly between groups, suggesting a comparable general perception of health status.

10. Comparative Analysis of Complications and Quality of Life in Patients with Bricker Urinary Diversion Performed via Open, Laparoscopic and Robotic Approaches

10.1 Introduction

Total pelvic exenteration (TPE) is a radical surgical procedure indicated for locally advanced and recurrent pelvic malignancies, with the objective of achieving complete (R0) resection, yet it is associated with substantial morbidity and mortality [151,237–242]. The Bricker ileal conduit, first described in 1950, remains the reference standard [243]; however, it carries the risk of late complications such as strictures and impaired renal function [243–245]. Minimally invasive approaches (laparoscopic and robotic) have been associated with reduced blood loss, faster recovery and shorter hospital stays compared with open surgery [248–251]. Quality of life (QoL) is influenced by physical, psychosocial and functional factors, with patients undergoing Bricker diversion reporting superior long-term outcomes [254–256]. The choice of diversion technique must therefore be individualized according to biological and oncological status [238,249].

The present study aimed to comparatively evaluate QoL at three months postoperatively using EQ-5D-5L and EQ-VAS and to analyze clinical and oncological parameters (operative time, length of hospitalization, complications, changes in hemoglobin and eGFR, tumor staging, adjuvant treatments), in order to highlight differences among open, laparoscopic and robotic approaches in TPE with Bricker diversion.

10.2 Materials and Methods

The study assessed the impact of surgical approach—open, laparoscopic, or robotic—for construction of the non-continent Bricker ileal conduit in patients undergoing pelvic exenteration. The cohort comprised three demographically and clinically comparable subgroups: open approach (n=18), laparoscopic (n=22), and robotic (n=18). Parameters analyzed included operative and hospitalization duration, incidence of early and late complications, need for re-intervention and use of JJ stents. Biological markers (hemoglobin, estimated glomerular filtration rate), tumor staging and requirement for adjuvant therapy were also evaluated.

Quality of life was assessed at three months postoperatively using EQ-5D-5L, which quantifies mobility, self-care, daily activities, pain/discomfort, and anxiety/depression, together with EQ-VAS, reflecting perceived overall health status. Statistical analyses included ANOVA, post-hoc tests (Tukey HSD, Games-Howell), Kruskal–Wallis with Dunn–Bonferroni corrections, Fisher’s exact test, χ^2 test and correlation coefficients (Pearson or Spearman). A significance threshold of $\alpha=0.05$ was applied using SPSS v25.0.

Intracorporeal robotic Bricker diversion requires careful patient selection, ideally those with BMI <30 kg/m², without prior abdominal surgery, radiotherapy, or major comorbidities [257]. Preoperative preparation includes both physiological optimization and intensive psychological support, involving a multidisciplinary team and the patient’s family to mitigate emotional burden and facilitate postoperative adaptation [116,258–260].

The surgical technique involves dorsal lithotomy positioning with steep Trendelenburg, the use of the Da Vinci Xi platform and a transperitoneal six-port approach [261,262]. The procedure includes identification and transection of the ureters, radical cystoprostatectomy with extended pelvic lymphadenectomy, isolation of an approximately 15 cm ileal segment and construction of Wallace B uretero-ileal anastomoses protected by mono-J stents [262–264]. The ileal segment is exteriorized and fixed to the abdominal wall, with placement of a pelvic drain and layered closure of the abdominal wall.



Figure 10.1 Patient positioning and trocar placement



Figure 10.2 Standard instrumentation



Figure 10.3 Da Vinci Xi platform



Figure 10.4 Positioning of the robotic arms

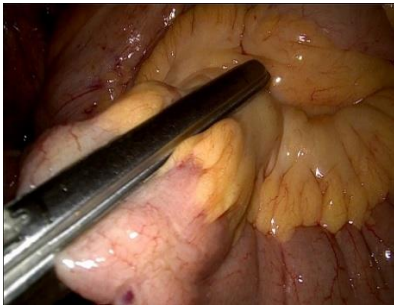


Fig. 10.5 Identification and isolation of the ileal segment

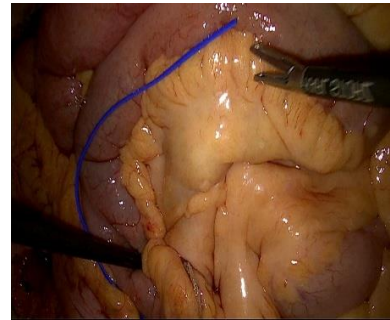


Fig.10.6 Mobilization of the selected ileal segment



Figure 10.7 Division of the ileal segment using a stapler



Figure 10.8 Creation of bilateral uretero-ileostomies

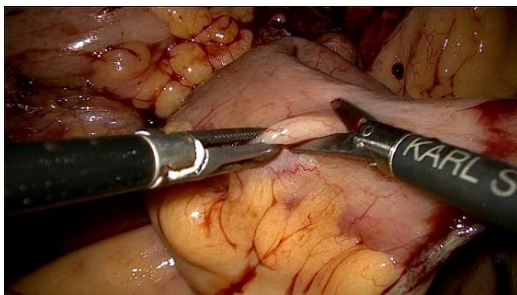


Figure 10.9 Ureteral fixation



Figure 10.10 Restoration of intestinal continuity

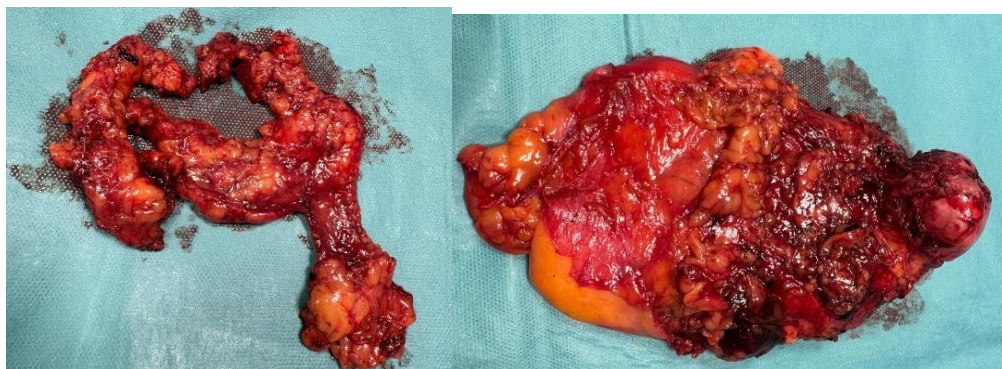


Figure 10.11 Excised surgical specimen

10.3 Results

This multicenter retrospective study included 58 patients with muscle-invasive bladder cancer who underwent radical cystectomy with Bricker diversion via open (n=18, 31%), laparoscopic (n=22, 37.9%), and robotic (n=18, 31%) approaches. The subgroups were demographically and preoperatively comparable with respect to sex and age (Fig. 10.12).

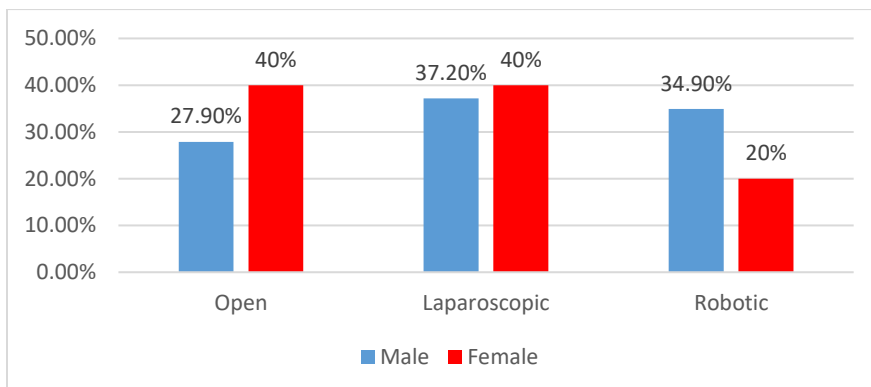


Figure 10.12 Distribution of patients by sex and surgical approach

Preoperative renal function (eGFR) was similar across groups ($p = 0.086$). Postoperatively ($p = 0.136$), divergent trends were observed: a significant increase in the open group ($p = 0.002$), a significant decrease in the laparoscopic group ($p = 0.021$), and no significant change in the robotic group ($p = 0.599$). Postoperative hemoglobin levels were higher in the robotic group compared with the open group (10.76 ± 1.24 vs. 9.71 ± 1.13 g/dL; $p = 0.042$), with similar reductions observed across groups ($p = 0.282$).

Operative time did not differ significantly ($p = 0.187$), though it was numerically longer in the robotic group (469 ± 92 minutes). Length of hospitalization was significantly shorter with minimally invasive approaches, particularly robotic (median 7 days), compared with open surgery

(13.5 days) ($p < 0.001$). Notable correlations were observed: in the laparoscopic group, operative time strongly correlated with hospitalization duration ($R = 0.984$; $p < 0.001$), and eGFR with hemoglobin pre- and postoperatively ($R \geq 0.95$; $p < 0.001$). In the robotic group, moderate correlations were noted between eGFR and hemoglobin ($R \approx 0.52$ – 0.60 ; $p \leq 0.026$). No significant correlations were identified in the open group (Table 10.8).

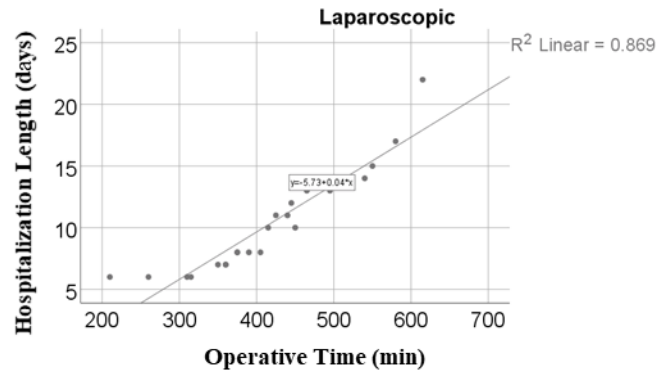


Fig 10.16 Correlation between operative duration and hospitalization length – laparoscopic approach

Table 10.8 Correlation between eGFR and hemoglobin values

Surgical Approach	Correlation	p-value
Correlation between preoperative eGFR and hemoglobin		
Open	Preoperative eGFR $\times$ Preoperative Hemoglobin	0.521, $R=0.162$
Laparoscopic	Preoperative eGFR $\times$ Preoperative Hemoglobin	<0.001, R=0.965
Robotic	Preoperative eGFR $\times$ Preoperative Hemoglobin	0.026, R=0.524
Surgical Approach	Correlation	p-value
Correlation between postoperative eGFR and hemoglobin		
Open	Postoperative eGFR $\times$ Postoperative Hemoglobin	0.312, $R= -0.252$
Laparoscopic	Postoperative eGFR $\times$ Postoperative Hemoglobin	<0.001, R=0.950
Robotic	Postoperative eGFR $\times$ Postoperative Hemoglobin	0.278, $R=0.270$
Correlation between changes in eGFR and hemoglobin values		
Open	Δ eGFR $\times$ Δ Hemoglobin	0.872, $R= -0.041$
Laparoscopic	Δ eGFR $\times$ Δ Hemoglobin	0.806, $R= -0.055$
Robotic	Δ eGFR $\times$ Δ Hemoglobin	0.009, $R=0.597$

Common complications (UTIs, wound complications, ileus, pyelonephritis) did not differ significantly among groups; however, “other complications” were more frequent in the laparoscopic cohort (54.5% vs. 5.6% open/robotic; $p < 0.001$). Tumor staging suggested potential discrepancies between pre- and postoperative assessments (increase in T3 stage; redistribution of tumor grading), without significant differences in the indication for adjuvant therapy ($p = 0.494$), although it was proportionally more frequent in the robotic group (33.3%).

Quality of life at three months: Most EQ-5D-5L dimensions were comparable between groups; however, self-care scores were superior in the laparoscopic group compared with the open group ($p = 0.028$; post-hoc $p = 0.023$) (Table 10.10). The total EQ-5D-5L score ($p = 0.213$) and utility index ($p = 0.201$) did not differ significantly, but EQ-VAS was significantly higher in the robotic cohort (median 90) compared with the open group (72.5; $p = 0.016$) (Table 10.11).

10. 4 Discussion

This multicenter retrospective study evaluated the impact of surgical approach (open, laparoscopic, robotic) on biochemical parameters, complications and quality of life following pelvic exenteration with Bricker diversion. Minimally invasive approaches demonstrated perioperative advantages over open surgery, with shorter hospitalization (median: 9 days laparoscopic, 7 days robotic vs. 13.5 days open; $p < 0.001$) and reduced blood loss; postoperative hemoglobin at 48 hours was higher in the robotic group ($\approx +1$ g/dL; $p = 0.042$) [266,267]. Operative time was numerically longer in the robotic group (~ 469 minutes), without statistical significance, consistent with the learning curve described in the literature [266]. Major common complications occurred at similar rates across groups; however, “other complications” were significantly more frequent in the laparoscopic group (54.5% vs. 5.6% open/robotic; $p < 0.001$), suggesting technical limitations of urinary reconstruction without the enhanced visualization and ergonomics provided by robotics [237,266]. Renal function (eGFR) increased postoperatively in the open group, decreased in the laparoscopic group and remained stable in the robotic group [242,268].

At three months, most EQ-5D-5L domains were comparable across surgical approaches, with the exception of inferior self-care in the laparoscopic group compared with open surgery ($p = 0.028$). EQ-VAS scores were significantly superior in the robotic cohort (median 90) compared with the open cohort (~ 72 ; $p = 0.016$), indicating a better overall perception of health status [256,265,269].

10.5 Conclusions

This study compared open, laparoscopic and robotic approaches for pelvic exenteration with Bricker diversion. Robotic surgery provided the most favorable perioperative profile, with shorter hospitalization, preservation of hematological status and superior EQ-VAS scores at three months. The laparoscopic approach was associated with a higher incidence of nonspecific complications and lower self-care scores, whereas renal function demonstrated variable trajectories across groups. Tumor staging and the need for adjuvant therapy were comparable. The findings confirm the feasibility of minimally invasive techniques—particularly robotic surgery—and highlight the importance of individualized surgical planning.

11. Conclusions and Personal Contributions

11.1 General Conclusions

This retrospective, multicenter, observational study comparatively evaluated clinical outcomes and quality of life in 102 patients undergoing pelvic exenteration, with two types of urinary diversion: simple cutaneous ureterostomy (SCU) and the Bricker ileal conduit, performed via open, laparoscopic, or robotic approaches.

SCU was associated with shorter procedures but prolonged hospitalization and a higher incidence of sepsis, being predominantly used in frail patients with comorbidities. The Bricker diversion demonstrated functional advantages and superior quality-of-life scores but was associated with a higher rate of nonspecific complications. The robotic approach was distinguished by shorter hospitalization, preservation of biological status and significantly improved EQ-VAS scores, while laparoscopy was associated with a higher incidence of complications.

The results validate the hypothesis that the type of urinary diversion and surgical approach influence peri- and postoperative outcomes. The Bricker diversion, particularly when performed robotically, offers superior oncological and functional outcomes, while SCU remains a practical option for patients with poor baseline status or in resource-limited centers.

The choice of method should be individualized based on biological status, tumor stage, available resources and surgical expertise. These findings support the development of modern, integrated urinary reconstruction protocols and emphasize the need for long-term, prospective, randomized studies.

11.2 Personal Contributions

This thesis is based on a retrospective, observational, multicenter study that comparatively assessed clinical outcomes and quality of life following simple cutaneous ureterostomy (SCU) and Bricker diversion performed via open, laparoscopic, or robotic approaches in locally advanced pelvic malignancies.

The original contributions are as follows:

- Chapter 7, Sections 1–4: Development of the multicenter methodological framework, standardized application of inclusion criteria and implementation of EQ-5D-5L and EQ-VAS scoring at three months postoperatively, for the first time in surgical oncology in Romania.
- Chapter 8, Subsection 8.3: Identification of differences between SCU and Bricker—higher incidence of postoperative sepsis in SCU (13.6% vs. 1.7%; $p = 0.041$), longer hospitalization (19 vs. 11 days; $p < 0.001$) and association of SCU with poorer biological status (lower eGFR and hemoglobin).
- Chapter 9, Subsection 9.3: Demonstration of superior functional autonomy with Bricker (better self-care and daily activity scores, $p = 0.030$ and $p = 0.036$) and validation of a similar overall health perception across groups (EQ-VAS, $p = 0.656$).
- Chapter 10, Subsection 10.2, Paragraph 5: Integration of psychological support and multidisciplinary team involvement in the preoperative preparation of patients for pelvic exenteration.
- Chapter 10, Subsection 10.3, Paragraphs 2, 7, 8, and 15: Comparative analysis of Bricker approaches—highlighting robotic advantages (shorter hospitalization: 7 vs. 13.5 days open; $p < 0.001$; EQ-VAS median 90 vs. 72.5; $p = 0.016$) and identification of significant correlation between operative duration and hospitalization in the laparoscopic group ($R = 0.984$; $p < 0.001$).
- Chapter 11, Paragraphs 3–6 and 8: Proposal of a differentiated clinical strategy for choosing urinary diversion type, based on preoperative biochemical parameters, QoL scores, estimated operative time and available technological resources.

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