Prolonged length of stay in ileal conduit compared to neobladder diversion in radical cystectomy patients for bladder cancer.

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Introduction

- Radical cystectomy with urinary diversion is the standard treatment for invasive and complicated malignancies of the bladder, urethra, and ureters.
- Complications of urinary diversion vary depending on the type of diversion used, and previous studies have shown no appreciable difference between ileal conduit and neobladder diversion.
- The existence of similar oncologic and functional outcomes between ileal conduits and neobladders warrants further exploration into opportunities for optimization in perioperative factors, specifically in terms of length of stay (LOS) and readmission, which are key measurements of quality associated with increased risk of complications, infections, higher costs, and decreased patient satisfaction.

Methods

- Retrospective study utilizing the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database (2019 – 2020) to compare length of stay and readmission after radical cystectomy with either ileal conduit or neobladder
- Analyzed data for 1,478 patients who underwent radical cystectomy with either ileal conduit or continent neobladder.
- Secondary outcomes: patient characteristics, comorbid conditions, malignancy stage, and various surgical outcomes.

Results

- After propensity score matching for age, independent functional status, and ASA classification, 892 patients were included in final cohort
- No statistical significance in terms of mean length of stay between the ileal conduit and neobladder groups (7.85 vs. 7.44 days, p = 0.185) (Table 2)

- Secondary endpoints (Illeal conduit vs. Neobladder) (Table 2):
  - Rates of readmission (21.5% vs 30%, p < 0.05)
  - Colonic anastomotic leak (6.3% vs 1.8%, p < 0.05)
  - Urinary anastomotic leak (3.1% vs 6.7%, p < 0.05)
  - Lymphocele/lymphatic leak (3.8% vs 8.5%, p < 0.05)
- Predictors of length of stay were different between groups (Tables 5 & 6)
  - Prior pelvic radiotherapy (p = 0.003) and a characterized bleeding disorder (p = 0.001) implicated in the ileal conduit group
  - Chemotherapy within 90 days (p = 0.004) and diabetes mellitus (p = 0.029) associated with LOS in the neobladder group

Discussion

- Initial analyses suggest longer hospital stays for ileal conduit patients compared to continent neobladder, which has implications for perioperative planning.
- Preoperative Factors and Baseline Health Status: findings show patients undergoing conduit diversion have *higher rates of prior pelvic radiation, recent chemotherapy, and weight loss, as well as more comorbidities*, highlighting the appropriate reasons for selecting this procedure over continent neobladder in certain patient populations.
- *The presence of increased anastomotic leaks in both colonic and neobladder urinary systems in the conduit group maybe explained by poor tissue conditions at the bowel anastomosis due to preoperative conditions such as chemotherapy, diabetes, and renal failure, all of which can impair wound healing and weaken the immune response.*
- Anastomotic sites are given adequate surgical attention, but the **difference in structural and histological makeup** between bowel and genitourinary tissue plays a **major role** in the pattern of anastomosis leaks between groups.
- Bleeding requiring transfusion, prolonged operative time, and superficial site infection represent classic surgical complications that can occur regardless of diversion type.

Rates of readmission were approximately 9% greater in neobladder patients

Different diversion, same length of stay

Table 2. Postoperative Outcomes Frequency Table, Conduit Diversion vs Neobladder

	Total Cohort n = 892		Conduit Diversion n = 446		Continent Neobladder n = 446		P Value
Readmission (Any Reason) (%)	230	(25.8%)	96	(21.5%)	134	(30.0%)	P < 0.001
Colonic Anastomotic Leak (%)	36	(4.0%)	28	(6.3%)	8	(1.8%)	P < 0.001
Urinary Anastomotic Leak (%)	44	(4.9%)	14	(3.1%)	30	(6.7%)	P < 0.001
Blood Transfusion (%)	261	(29.3%)	129	(28.9%)	132	(29.6%)	P = 0.825
Mean Operative Time in Minutes (SD)	352.78	(125.39)	326.23	(116.96)	379.33	(128.02)	P < 0.001
Mean Length of Stay in Days (SD)	7.65	(4.60)	7.85	(4.71)	7.44	(4.48)	P = 0.185
Mean Days to Discharge in Days (SD)	7.42	(4.05)	7.54	(4.26)	7.28	(3.83)	P = 0.350
Superficial Surgical Infection (%)	40	(4.5%)	24	(5.4%)	16	(3.6%)	P = 0.196
Deep Surgical Infection (%)	4	(0.6%)	3	(0.7%)	2	(0.4%)	P = 0.654
Organ Space Surgical Infection (%)	78	(8.7%)	39	(8.7%)	39	(8.7%)	P = 1.000
Post Op Sepsis (%)	78	(8.7%)	35	(7.8%)	43	(9.6%)	P = 0.343
Post Op Septic Shock (%)	18	(2.0%)	8	(1.8%)	10	(2.2%)	P = 0.634
Post Op UTI (%)	76	(8.5%)	32	(7.2%)	44	(9.9%)	P = 0.150
Post Op PNA (%)	20	(2.2%)	12	(2.7%)	8	(1.8%)	P = 0.366
CVA/Stroke w/ Neuro Deficit (%)	4	(0.4%)	3	(0.7%)	1	(0.2%)	P = 0.317
Cardiac Arrest Requiring CPR (%)	4	(0.4%)	1	(0.2%)	3	(0.7%)	P = 0.317
Post Op Myocardial Infarction (%)	8	(0.9%)	5	(1.1%)	3	(0.7%)	P = 0.478
Post Op Pulmonary Embolism (%)	11	(1.2%)	3	(0.7%)	8	(1.8%)	P = 0.130
Post Op DVT (%)	17	(1.9%)	10	(2.2%)	7	(1.6%)	P = 0.463
Discharge to Facility (%)	70	(7.9%)	55	(12.3%)	15	(3.4%)	P < 0.001
Rectal Injury (%)	10	(1.1%)	5	(1.1%)	5	(1.1%)	P = 1.000
Pt on Ventilator (Greater than 48 hours) (%)	5	(0.6%)	4	(0.9%)	1	(0.2%)	P = 0.179
Wound Disruption (%)	21	(2.4%)	8	(1.8%)	13	(2.9%)	P = 0.270
Clostridium Difficile Colitis (%)	18	(2.0%)	5	(1.1%)	13	(2.9%)	P = 0.057
Prolonged Postop NPO or NGT (%)	157	(17.6%)	96	(21.5%)	61	(13.7%)	P < 0.001
Lymphocele or Lymphatic leak (%)	55	(6.2%)	17	(3.8%)	38	(8.5%)	P < 0.001
Progressive Renal Insufficiency (%)	21	(2.4%)	8	(1.8%)	13	(2.9%)	P = 0.270

P Value represents T-Test for continuous variables and Chi-Square for categorical variables.
UTI = Urinary Tract Infection, PNA = Pneumonia, CVA = Cerebrovascular accident, CPR = Cardiopulmonary resuscitation, DVT = Deep Vein Thrombosis, SNF = Skilled Nursing Facility, NPO = Nothing by mouth, NGT = Nasogastric Tube

Conclusion and Future Plans

- Our findings are consistent with a recent study by Rezaee et al, which showed no statistically significant difference in LOS between urinary diversion groups
- Long-term cancer outcomes are *unaffected* by urinary diversion type, providing an opportunity for outside partners to play an outsized role in cost-saving measures.
- Evidence supporting *that neither procedure has increased LOS* is important for providing appropriate **patient-centered care** and improving the quality of life considerations associated with voiding.
- Future studies may investigate strategies to *mitigate* the impact of preoperative conditions on wound healing and immune response to *decrease the incidence of anastomotic leaks* and other surgical complications in patients undergoing conduit diversion.

Figures & Tables

Table 1. Patient Characteristics, Conduit vs. Neobladder

	Total Cohort n = 892		Conduit Diversion n = 446		Continent Neobladder n = 446		P Value
Patient Demographics							
Mean Age (Range)*	65	(34 – 87)	65	(34 – 87)	65	(34 – 87)	P = 1.000
Male Gender (%)	683	(76.7%)	301	(67.5%)	382	(85.7%)	P < 0.001
Race, Non-Caucasian (%)	51	(5.72%)	26	(5.8%)	25	(5.6%)	P = 0.407
Hispanic Ethnicity (%)	31	(4.2%)	19	(4.3%)	12	(2.7%)	P = 0.230
Preoperative Considerations:							
Open Operative Approach (%)	676	(75.8%)	327	(73.3%)	349	(78.2%)	P = 0.086
Admitted from Other Than Home (%)	10	(1.1%)	8	(1.8%)	2	(0.4%)	P = 0.257
Preoperative ASA Classification Greater than 3 (%)	718	(80.5%)	359	(80.5%)	359	(80.5%)	P = 1.000
Preoperative Functional Health Status (%)*	890	(99.8%)	445	(99.8%)	445	(99.8%)	P = 1.000
Preoperative Open Wound or Wound Infection (%)	11	(1.2%)	7	(1.6%)	4	(0.9%)	P = 0.363
> 10% Decrease in Body Weight in 6 Months (%)	33	(3.7%)	24	(5.4%)	9	(2.0%)	P < 0.001
Preoperative Oral Antibiotic Prescription (%)	87	(9.8%)	50	(11.2%)	37	(8.3%)	P = 0.143
Prior Pelvic Surgery	486	(54.5%)	275	(61.7%)	211	(47.3%)	P < 0.001
Prior Pelvic Radiotherapy	154	(17.3%)	130	(29.1%)	24	(5.4%)	P < 0.001
Chemotherapy (within 90 days of surgery) (%)	583	(65.4%)	333	(74.7%)	250	(56.1%)	P < 0.001
Comorbidities:							
Transfusion within 72 hours of Surgery (%)	14	(1.6%)	11	(2.5%)	3	(0.7%)	P = 0.031
Hemodialysis Dependent (%)	7	(0.8%)	7	(1.6%)	0	(0.0%)	P < 0.001
Current Smoker (within past year) (%)	189	(21.2%)	97	(21.7%)	92	(20.6%)	P = 0.682
Diabetes Mellitus Treated with Insulin (%)	60	(6.7%)	40	(9.0%)	20	(4.5%)	P < 0.001
Diabetes Mellitus Treated with Oral Medication (%)	102	(11.4%)	51	(11.4%)	51	(11.4%)	P = 1.000
Congestive Heart Failure (%)	4	(0.4%)	2	(0.4%)	2	(0.4%)	P = 1.000
Severe COPD (%)	47	(5.3%)	30	(6.7%)	17	(3.8%)	P = 0.052
Hypertension (Treated with Medication) (%)	500	(56.1%)	261	(58.5%)	239	(53.6%)	P = 0.138
Steroid Use for Chronic Medical Condition (%)	32	(3.6%)	18	(4.0%)	14	(3.1%)	P = 0.472
Dyspnea (%)	40	(4.5%)	23	(5.2%)	17	(3.8%)	P = 0.332
Bleeding Disorder (%)	19	(2.1%)	16	(3.6%)	3	(0.7%)	P < 0.001

Propensity score matching with age, ASA classification, independent functional status.
P Value represents T-test for continuous variables or Chi-Square for categorical variables.
ASA = American Society of Anesthesiologists, COPD = Chronic Obstructive Pulmonary Disorder
*Variables used for propensity score matching

Table 4. Predictors Length of Stay Ileal Conduit Compared to Neobladder Diversion in Radical Cystectomy Patients
Multivariable Gamma Regression Analysis: Length of Stay in Radical Cystectomy Patients

	Univariate Analysis			Multivariable Analysis		
	OR	(95% CI)	P value	OR	(95% CI)	P value
Urinary Diversion						
No Urinary Diversion	Referent			Referent		
Urinary Ileal Conduit	1.01	0.90 – 1.13	0.829	1.05	0.94 – 1.17	0.395
Neobladder Diversion	1.06	0.94 – 1.18	0.343	1.01	0.91 – 1.13	0.800
Male Gender	0.97	0.88 – 1.07	0.538	0.98	0.90 – 1.07	0.674
Greater than 10% body weight loss	1.24	1.01 – 1.53	0.043	1.2	0.99 – 1.47	0.073
Prior Pelvic Radiotherapy	1.19	1.07 – 1.31	0.001	1.17	1.06 – 1.30	0.003
Chemotherapy Within 90 days	0.88	0.81 – 0.95	0.002	0.9	0.83 – 0.97	0.007
Diabetes Meletus Insulin	1.17	1.00 – 1.37	0.050	1.17	1.01 – 1.37	0.042
Bleeding Disorder	1.27	0.98 – 1.68	0.085	1.25	0.97 – 1.63	0.098

Table 5. Predictors of Length of Stay in Ileal Conduit Diversion Group
Multivariable Gamma Regression Analysis: Length of Stay

	Univariate Analysis			Multivariable Analysis		
	OR	(95% CI)	P value	OR	(95% CI)	P value
Male Gender	0.91	0.76 – 1.09	0.319	0.9	0.78 – 1.05	0.186
Greater than 10% body weight loss	0.94	0.65 – 1.45	0.773	0.98	0.71 – 1.41	0.915
Prior Pelvic Radiotherapy	1.43	1.11 – 1.87	0.007	1.41	1.13 – 1.79	0.003
Chemotherapy Within 90 days	0.91	0.81 – 1.03	0.137	0.94	0.85 – 1.05	0.289
Diabetes Meletus Insulin	0.98	0.75 – 1.32	0.911	1	0.79 – 1.28	0.990
Bleeding Disorder	2.74	1.56 – 5.45	0.001	2.71	1.58 – 5.20	0.001

Table 6. Predictors of Length of Stay in Neobladder Group
Multivariable Gamma Regression Analysis: Length of Stay

	Univariate Analysis			Multivariable Analysis		
	OR	(95% CI)	P value	OR	(95% CI)	P value
Male Gender	0.99	0.87 – 1.13	0.913	1.04	0.91 – 1.18	0.589
Greater than 10% body weight loss	1.24	0.96 – 1.62	0.108	1.24	0.97 – 1.61	0.090
Prior Pelvic Radiotherapy	1.03	0.90 – 1.19	0.679	0.99	0.87 – 1.14	0.917
Chemotherapy Within 90 days	0.8	0.70 – 0.92	0.002	0.81	0.71 – 0.94	0.004
Diabetes Meletus Insulin	1.25	1.03 – 1.55	0.032	1.25	1.03 – 1.54	0.029
Bleeding Disorder	1.01	0.74 – 1.42	0.957	1.04	0.77 – 1.44	0.827