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Comparative Study Between Orthotopic Neobladder and Ileal Conduit Diversion for Patients With Cancer Bladder After Radical Cystectomy

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Abstract

Background: Following radical cystectomy, several techniques are employed for urine diversion, such as the ileal conduit, cutaneous urinary reservoir, and orthotopic neobladder. The many forms of urine diversion significantly influence multiple dimensions of quality of life (QoL), encompassing urinary function, physical well-being, sexual health, psychological adjustment, everyday functioning, and body image-related unhappiness.

Aim and objectives: This is to compare between QoL, results, and complications of orthotopic urinary diversions and ileal conduit diversion after radical cystectomy in patients with muscle-invasive bladder cancer.

Patients and methods: This prospective study conducted at the OncoSurgery Department, Al-Azhar University Hospitals and Benisuef Insurance Hospital. It will include 20 patients with orthotopic bladder and 20 patients with ileal conduit diversion who will be admitted to the OncoSurgery Department for radical cystectomy.

Result: Excellent perioperative management and close lifelong follow-up of these patients are mandatory to detect early and late complications and prevent their long-term consequences, especially on renal functions.

Conclusion: Radical cystectomy and diversion represent a complex procedure that attempts to maximize health-related QoL for patients after surgery. In appropriately chosen individuals, establishing an orthotopic bladder enables the removal of an external stoma and maintenance of body image, while still ensuring effective cancer management as compared to ileal conduit diversion.

Keywords: Cancer, Cystectomy, Ileal conduit diversion, Orthotopic neobladder

1. Introduction

Bladder cancer ranks as the seventh most frequently detected cancer among males globally but falls to the 11th position when accounting for both sexes. The age-standardized incidence rate of bladder cancer, expressed per 100,000 person-years, is 9.0 for males and 2.2 for females worldwide.¹

Further spread to the presacral lymph nodes and the retroperitoneal nodes in the paracaval, inter aortocaval, and para-aortic lymph node chains can also be seen.²

Several studies have reported the comparative advantages of orthotopic neobladder over alternative kinds of diversion following radical cystectomy,

highlighting the differences in quality of life (QoL) among these various options.³

To opt for a neobladder as the preferred method of urine diversion, patients must possess unimpaired renal and hepatic functions, as well as a high likelihood of adhering to neobladder training protocols.⁴

It is crucial to engage in comprehensive preoperative counseling with patients regarding the potential risks associated with orthotopic neobladder diversion, particularly about incontinence (both during the day and at night) and hypercontinence.⁵

The use of stoma appliances is commonly required, although incontinent diversions have exhibited more significant enhancements in physical well-being than continent diversions. Conversely,

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continent diversions have demonstrated superior emotional functioning and body image compared to cutaneous diversions.^{6,7}

Over an extended duration, it has been observed that the occurrence of stone formation in neobladders ranges from 4 to 6%, while continent cutaneous diversions exhibit stone formation rates of up to 42%.⁸

Stomal hernias occurring in the vicinity of the ileal conduit have been documented in a range of 5–65% of instances, and it has been observed that around one-third of these cases eventually necessitate surgical intervention for repair. The presence of chronic acidosis and stasis in individuals is known to play a significant role in the development of urinary stones.

Different studies have shown varying rates of metabolic acidosis: 5–15% for ileal conduits, 6–13% for orthotopic neobladders, and 26–45% for continent cutaneous diversions.⁹ Osteopenia and bone demineralization can result from persistent acidity. Individuals who already have renal impairment are considerably more vulnerable.¹⁰

2. Patients and methods

This prospective study will be conducted at Oncosurgery Department, Al-Azhar University Hospitals and Benisuef Insurance Hospital.

It will include 20 patients with orthotopic bladder and 20 patients with ileal conduit diversion who will be admitted to the Oncosurgery Department for radical cystectomy.

Inclusion criteria: all patients with invasive urinary bladder cancer demonstrated histologically on transurethral resection biopsies cancer.

Exclusion criteria: include patient refusal, patients who have chronic gastrointestinal tract disease, and invasion of a tumor to the neck of the bladder.

2.1. Interventions

Radical cystectomy+orthotopic neobladder or ileal conduit diversion. The surgical outcomes will be analyzed in detail. Various QoL areas were evaluated, such as general and physical health, psychological health, social status, sexual life, symptoms connected to diversion, and treatment satisfaction. The median operative time and the median intraoperative blood loss will be measured. Need for blood transfusion, visceral injury, radicality, and recurrence will be recorded. Intraoperative and postoperative complications will be observed in all patients. The amount of blood loss and the incidence of complications in our study will be compared to previous reports of cystectomy.

2.2. Methods

This prospective study will enroll 40 patients suffering from bladder cancer.

2.2.1. Full records

The information provided in the oncologic sheet (personal history, complaint, present history, past history – with particular attention to the history of any prior abdominal or pelvic surgery, intestinal resections, diverticulitis, or radiation for any pelvic malignancy and family history – will determine which patient will be placed in bed first for each patient).

2.2.2. Examination

In the form of general and local examinations.

2.2.3. Investigation

All patients were subjected to laboratory investigations represented by complete blood count, blood sugar level, kidney functions, liver functions, coagulation profile, lipid profile, hepatitis markers, and tumor markers.

2.2.4. Radiological

Represented by abdomino-pelvic ultrasound, computed tomography, and MRI.

2.2.5. Cystoscopic resection biopsy

It is the gold standard for diagnosis.

2.2.6. Follow up

Follow-up will be done just postoperatively 3, 6, 12, and 18 months after operations to evaluate complications, continence, QoL, recurrence, and survival rate.

2.3. Statistical analysis

Groups will be compared statistically using the Kruskal–Wallis test for categorical variables. Survival between the two groups of revascularization status will be estimated by the Kaplan–Meier method. All analyses will be conducted using SPSS, ver.17.0 (SPSS Inc., Chicago, Illinois, USA). A *P* value of 0.05 will be considered significant. Data will be analyzed using SPSS (statistical package of social science), version 17.0.

The Kruskal–Wallis analysis of variance will be used to examine the quantitative data, which will be displayed as the mean and SD. The significant group will be ascertained by post-hoc analysis of the significant Kruskal–Wallis analysis of variance test. The χ^2 test will be used to examine the qualitative data, given as numbers and percentages. *P* values less than 0.05 are statistically significant, and those less than 0.01 are statistically highly significant.

3. Results

This cross-sectional study was carried out on 40 patients who visited Oncosurgery Department, Al-Azhar University Hospitals and Benisuef Insurance Hospital from 2021 to June 2023. All patients underwent clinical examination and investigations for assessment according to their condition. After enrollment in the study, patients were divided into two equal groups: group I represented 20 male patients with orthotopic bladder and group II represented 19 male patients and one female with ileal conduit diversion who will be admitted to the Oncosurgery Department for radical cystectomy.

The mean duration of radical cystectomy with ileal conduit ($4.1 + 0.63$) while in patients with orthotopic bladder ($5.1 + 0.62$). The median age at the time of cystectomy was 59 years and the age ranged between 41 and 70 years.

3.1. Preoperative comorbidities

Eight (20%) of patients were diabetic, six (15%) had liver disease and two (5%) had ischemic disease.

3.2. Preoperative continence

All patients of our study in the group I were content with no voiding disorder before surgery as documented in patients files and by asking living patients.

3.3. Pathological tumor type

Postoperative pathological analysis revealed 26 (65%) patients with transitional cell carcinoma, eight (20%) patients with squamous cell carcinoma, and six (15%) patients with adenocarcinoma.

3.4. Postoperative pathological staging

Regarding TNM staging, were found three (8%) patients T2a, 26 (65%) patients T2b, eight (20%) patients with T3a, and three (7%) patients with T3b.

3.5. Neoadjuvant chemotherapy

Neoadjuvant chemotherapy was given to six (15%) patients.

3.6. Adjuvant chemotherapy

Regarding adjuvant treatment, 14 (35%) patients receive postoperative chemotherapy due to advanced postoperative pathological staging.

3.7. Postoperative complication

Regarding complications after radical cystectomy, orthotopic neobladder, and ileal conduit including:

Early complications: the most common was postoperative urinary leakage which was documented in four patients in group I and two (15%) patients in group II that presented as high drain output and elevated creatinine levels in the drain.

Burst abdomen and wound dehiscence were seen in one patient in group I and two patients in group II (7, 5%) who were managed surgically by mass closure and tension suturing.

Intestinal leakage was documented in two patients in group I and two (10%) patients in group II, which are managed conservatively.

Deep vein thrombosis developed in two (5%) patients. One of these cases in group I, pulmonary embolism developed and was fatal, while the other case in group II, which was treated successfully with high dose low molecular weight heparin.

Urinary tract infection: urinary tract infection was reported in eight patients in group I and four (30%) patients in group II. According to the severity of the infections, oral or intravenous fluids and antibiotics were used to treat the most frequent problems in our study.

Obstructive uropathy was reported in six patients in group I and two patients in group II due to mucus secretions.

Late complications: these complications are represented by:

Recurrence of tumor: four patients in group I and two (15%) in group II had recurrences. Four individuals had localized recurrence in the pelvis, one patient was recurrent distally in the lung, and one patient was in both (local and distant) after 1 year.

Ureteroenteric stricture: was seen in eight (20%) patients, six patients were in orthotopic bladder, and two patients in ileal conduit were evidence of hydroureter and hydronephrosis. Two cases were treated by surgical revision to urterocutaneous stoma and stent, and two cases were treated conservatively. Four cases were treated by percutaneous nephrostomy, however, ipsilateral kidney function loss happened in three patients.

Renal impairment: four patients in group I and two patients in group II had elevated creatinine levels, exceeding 3.5 mg/dl. While receiving regular dialysis, two patients experienced severe metabolic acidosis that necessitated hospitalization to the ICU.

The incisional hernia was documented in two patients in group I and one patient in group II, which was managed conservatively in two cases and surgical in one case with mesh repair.

Adhesive intestinal obstruction was reported in two cases in orthotopic bladder and one in the ileal conduit. They were readmitted to the surgical ward and received conservative measures.

3.8. Mortality

Among these 40 patients, one patient died in the early postoperative period due DVT, two with orthotopic bladder died in the first 6 months after surviving early postoperative period deterioration of kidney functions with renal impairment, and one with ileal conduit due to intestinal leakage and sepsis with death in ICU and pulmonary embolism.

3.9. Functional outcomes

3.9.1. Continence status

The frequency of using protective pads and any medication that may improve incontinence were determined by group I using the validated short-form scoring method of the International Consultation on Incontinence Questionnaire.

Urinary incontinence was categorized as mild (1–5), moderate (6–10), and severe (>10) based on the corresponding International Consultation on Incontinence Questionnaire-SF. The term ‘diurnal continence’ refers to total dryness without protective pads or stress leaks. Complete dryness without needing protective pads, repeated awakenings (more than thrice), or medication is known as nocturnal continence.

In our study, two (10%) patients were completely dry mild incontinence was seen in four (20%) patients with pad usage from 0 to 2 per day. Diurnal continence and nocturnal incontinence were defined as moderate incontinence seen in six (30%) patients. Severe incontinence was seen in eight (40%) patients. In the patients who achieved continence, the mean time to regain continence was 8 months. On the other hand, in group II, most patients are incontinent.

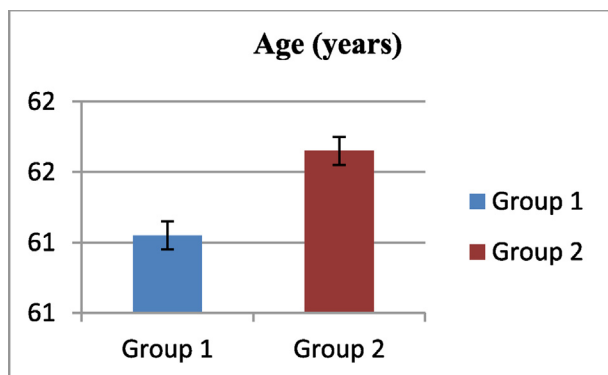


Fig. 1. Demographic characteristics of the studied groups.

3.10. Sexual outcome

In group I, 18 (90%) patients had erectile dysfunction. They were treated with sildenafil, while two (10%) patients were potent. On the other hand, most patients were impotent in group II.

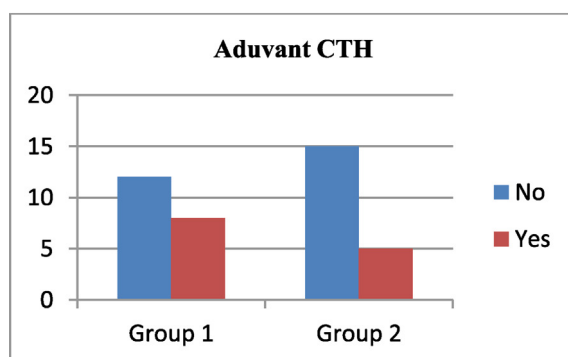
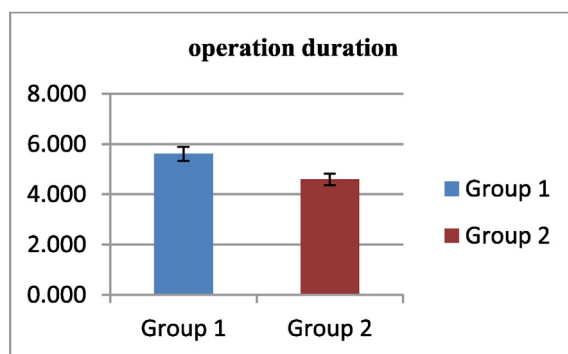
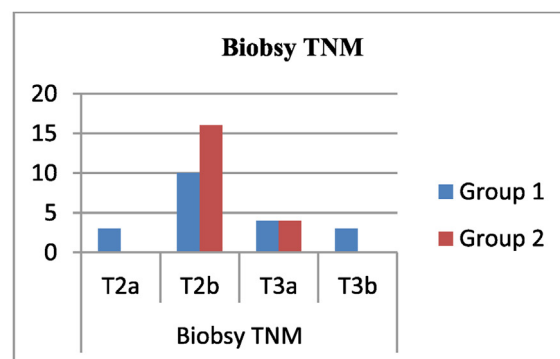
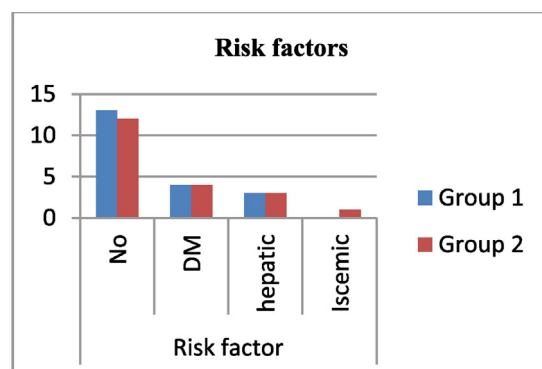


Fig. 2. Clinical characteristics of the studied groups.

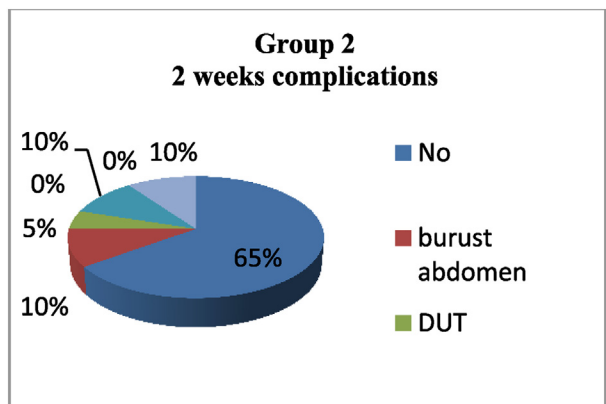
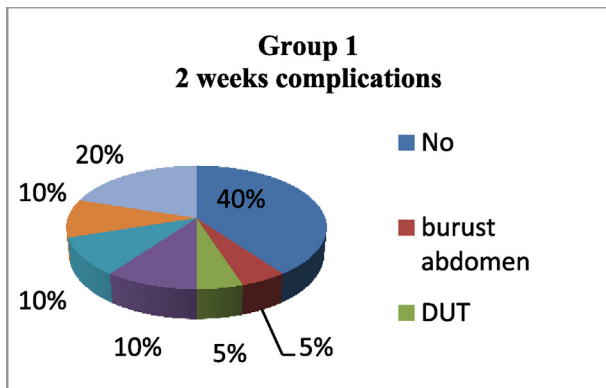


Fig. 3. Follow up of the studied groups after 2 weeks.

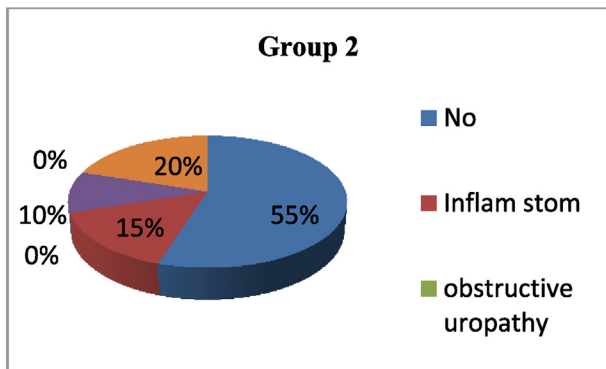
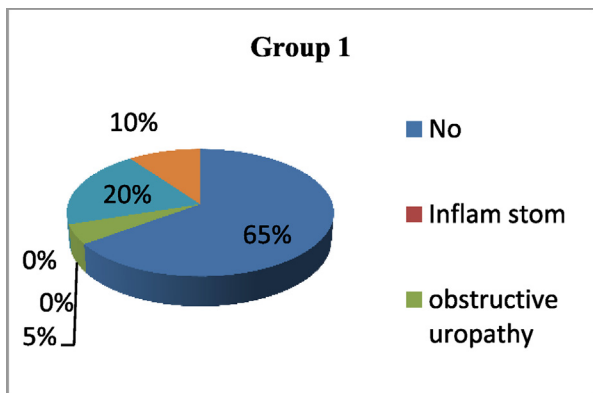


Fig. 4. Complications of the studied groups after 3 months.

Table 1. Demographic characteristics of the studied groups.

	Group I		Group II		P value
Age (years)					
Mean ± SD	61.05 ± 6.82		61.65 ± 7.41		0.79
Range	51–70		50–72		
	Group I		Group II		P value
	Count	%	Count	%	
Sex					
Male	20	100	19	95	0.5
Female	–	–	1	5	

Table 2. Clinical characteristics of the studied groups.

	Group I		Group II		P value
Risk factors					
No	13 (65)		12 (60)		0.79
DM	4 (20)		4 (20)		
Hepatic	3 (15)		3 (15)		
Ischemic	–		1 (5)		
Biopsy TNM					
T2a	3 (15)		–		0.06
T2b	10 (50)		16 (80)		
T3a	4 (20)		4 (20)		
T3b	3 (15)		–		
Biopsy pathology					
Adenocar	3 (15)		3 (15)		1
Squamous	4 (20)		4 (20)		
Transition	13 (65)		13 (65)		
Adjuvant CTH					
No	12 (60)		15 (75)		0.24
Yes	8 (40)		5 (25)		
	Group I		Group II		P value
Operation duration					
Mean ± SD	5.61 ± 0.38		4.59 ± 0.49		<0.001 ^a
Range	5–6.2		4–6		

CTH, chemotherapy; DM, diabetes mellitus.

^a P value <0.001.

3.11. Stoma complications

In group I, there is no stoma, while in group II, the stoma has a lot of complications as inflammation around it occurred in four (25%) patients, ischemia of the stoma 0 patient, stomal prolapse in one (5%)

Table 3. Follow up of the studied groups after 2 weeks.

	Group I [n (%)]	Group II [n (%)]	P value		
2 weeks complications					
No	8 (40)	13 (65)	0.40		
Burst abdomen	1 (5)	2 (10)			
DUT	1 (5)	1 (5)			
Ileus	2 (10)	–			
Intestinal leak	2 (10)	2 (10)			
Psychosis	2 (10)	–			
Urinary leak	4 (20)	2 (10)			
	Group I		Group II		
2 weeks stay			P value		
Mean ± SD	12.95 ± 1.79		6.65 ± 1.63		<0.001 ^a
Range	10–17		5–10		

^a P value <0.001.

Table 4. Complications of the studied groups after 3 months.

	Group I [n (%)]	Group II [n (%)]	P value
3 months complications			
No	13 (65)	11 (55)	0.05
Inflammation stoa	–	3 (15)	
Obstructive uropathy (OU)	1 (5)	–	
OU	–	2 (10)	
OU, UTI	4 (20)	–	
UTI	2 (10)	(20)	

UTI, urinary tract infection.

Table 5. Follow up of the studied groups after 6 months.

	Group I [n (%)]	Group II [n (%)]	P value
5 months 6 sexual complications			
ED	18 (90)	20 (100)	0.24
Potent	2 (10)	–	
7 months 8 complications			
No	12 (60)	17 (85)	0.34
Adhesive IO	2 (10)	1 (5)	
Incisional Hernia	2 (10)	1 (5)	
RF	4 (20)	1 (5)	

ED, erectile dysfunction.

patients, para-stomal hernia in two (10%) patients, and psychological state (Figs 1–4 and Tables 1–5).

4. Discussion

Reduction of morbidity, quick postoperative rehabilitation, short hospital stay, and cost-cutting are challenging objectives for radical cystectomy with urine diversion.¹¹

Our study is conducted upon 40 patients. Compared two groups: group I 20 patents had orthotopic bladder and group II 20 patients had ileal conduit after radical cystectomy. The analysis demonstrates the benefits and drawbacks of each kind. The disease, patient culture, and patient selection all influence the diversion choice.

According to our research, patients over 70 years old are still less likely to obtain orthotopic diversion; however, they still have good postoperative QoL and a good performance status. They can be treated with an orthotopic urinary diversion.

Our research indicates that smoking and ischemic heart disease have a substantial detrimental influence on QoL following surgery. Therefore, we advise patients with ischemic heart disease to use cutaneous urine diversion, which is less stressful for them, particularly in the early postoperative phase.

Even though such patients had lower QoL compared to noncomplicated cases, their nephrostomy-related problems, declining renal function, episodes of renal colic, and frequent hospital admissions were all contributing factors.¹²

In our research, regaining continence took 8 months. Generally, continence improves in the first 6–12 months following surgery as the reservoir's compliance increases, allowing patients to store more volume at lower pressure. Patients also learn to void by coordinating the avalsalva maneuver with their pelvic floor's relaxation, which causes the pouch to spontaneously empty. Often, achieving daytime continence comes before achieving nighttime continence.

The rate of daytime continence varies depending on the method and definition of incontinence used in various cystectomy series. In a long-term follow-up study spanning up to 20 years,¹³ it was discovered that daytime continence rapidly improved and stabilized 12 months following surgery. They observed that for 7 years, this percentage did not change.

A challenging clinical issue, persistent severe incontinence has been shown to have a significant negative impact on patients' QoL and overall satisfaction.

While it is widely acknowledged that a considerable number of patients with orthotopic bladder experience difficulties related to sexuality, only 10% of patients in our study were categorized as potent and did not experience any sexual dysfunction. We found a high complication rates among patients with performance state when performance state is high rate of complications decline.

Orthotopic bladder provides good functional results and QoL, but more early complications, hospital stay late complications and mortality compared with ileal conduit.¹⁴

4.1. Conclusion

The complicated process of radical cystectomy and diversion aims to improve patients' QoL following surgery in terms of their health. In contrast to ileal conduit diversion, the development of an orthotopic bladder in carefully chosen patients permits the removal of an external stoma and preserves body image without compromising cancer control. Nevertheless, because to the nature of the treatment, there is a considerable likelihood of early and late complications, death, and low QoL among patients who have poor functional outcomes.

Ethical approval and consent statement

It was approved by faculty council.

Conflicts of interest

There are no conflicts of interest.

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