

Original Article

Reconstruction of Urinary and Gastrointestinal Tracts in Patients Submitted to Pelvic Exenteration and Sphincter Preservation

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Abstract

Background and Objective: Reports in the literature regarding reconstruction of the lower urinary tract with orthotopic ileal neobladder post radical cystectomy for either non-transitional cell bladder tumors or other pelvic malignancies are rare. In such cases, the reconstruction with orthotopic neobladder may represent a technical and therapeutic challenge, especially due to patients' previous treatments like radiotherapy. To evaluate the feasibility and oncological results of the reconstruction of urinary and gastrointestinal tracts in patients submitted to pelvic exenteration. **Methods:** From April 1995 to January 2004, 13 patients with pelvic malignancies and non-transitional cell bladder tumors were submitted to pelvic exenteration. Bladder reconstruction was accomplished through orthotopic ileal neobladder in all cases. Seven patients had total pelvic exenteration with anal sphincter-sparing procedure done as well as double-stapled colorectal anastomosis. **Results:** The mean age was 50 years. In 6 patients late complications, such as hydronephrosis and urinary infection, were observed. No patient presented day-time urinary incontinence after 6 months. During the follow-up period, no urethral recurrences were noted and all patients remained with their functional neobladders. Two patients died of treatment-related causes and three died of cancer; seven patients are alive with no evidence of disease and one is alive with cancer. Overall and cancer-specific survival at 24 and 60 months was 77.0% and 57%, respectively, and the mean of follow-up was 47% months (median 43 month). **Conclusions:** Urinary sphincter preservation and bladder reconstruction with orthotopic ileal neobladder with or without concomitant fecal sphincter preservation is a valuable option in patients with non-transitional cell bladder tumors or other pelvic malignancies that require radical cystectomy for curative purposes.

Key Words: Pelvic exenteration. Neobladder. Urinary reconstruction. Sphincter preservation. Pelvic tumor.

Introduction

It is estimated that 25% of patients with bladder neoplasms will be submitted to radical cystectomy and will need some type of urinary diversion. Indications and contraindications of reconstruction of the lower urinary tract with orthotopic ileal neobladder in patients with transitional cell carcinomas are well established in the literature.¹⁻³

Treating either non-transitional cell bladder tumors or other pelvic malignancies may require a cystectomy in order to reach adequate margins. Consequently, a urinary diversion will be needed. Considering its low technical complexity and

aiming to decrease surgical timing in large resections, the most common procedure is cutaneous ureteroenterostomy.

On the other hand, an orthotopic urinary diversion represents a technical and therapeutic challenge due to previous treatments, and the high risk of pelvic recurrence inherent to certain

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malignancies may interfere in the results. Reports in the literature on this kind of reconstruction in this situation are very rare.

The authors present the experience of using orthotopic ileal neobladder after radical surgery to treat either non-transitional cell malignant tumors affecting the bladder or other pelvic malignancies. This study aims to evaluate the feasibility and oncological results of the reconstruction of urinary and gastrointestinal tracts in patients submitted to pelvic exenteration.

Material and Methods

From April 1995 to January 2004, 118 patients were submitted to pelvic exenteration. Of these patients, we analyze 13 that were submitted to urinary sphincter preservation and reconstruction with orthotopic ileal neobladder with or without concomitant fecal sphincter preservation. These patients presented either non-transitional cell malignant tumors of the bladder or other pelvic malignancies. Only three patients had not been submitted to any previous treatment. Four patients had initially been treated in other institutions. Data were retrospectively reviewed based on medical records.

Urethra sparing technique according to the principles of oncologic resection was observed with all patients. A minimum of 80% in the Karnofsky performance status scale was observed, as well as patients' ability to understand the orthotopic urinary reconstruction and its possible complications.

In one case the Studer technique was employed.⁴ In the other cases, a modified Studer technique was chosen, with the use of 60cm of detubularized intestinal segment and construction of a "J" reservoir.

Statistics methods: The chi-square test was used to correlate variables, the Kaplan-Meier method to analyze actuarial survival, and the multiple logistic regression model for multivariate analysis, and Cox proportional hazard model for curve comparing.

Results

Seven patients were male and six female. Age ranged from 21 to 72 years (mean and median

of 50 years). Follow-up ranged from 1 to 106 months (mean of 47 and median of 42 months).

In relation to surgical risk, patients were classified in terms of the American Society of Anesthesiology (ASA) as ASA I (23.1%), ASA II (61.5%), and ASA III (15.4%).

Regarding histological type, there were four primary non-transitional cell malignant bladder tumors, being one squamous cell carcinoma, two bladder sarcomas and one small cell carcinoma. There were also nine other pelvic malignancies: one squamous cervix cell carcinoma, two uterine sarcomas, three retroperitoneum sarcomas, and three rectum adenocarcinomas. (Table 1)

Seven cases were submitted to total pelvic exenteration with anal sphincter-sparing procedure done as well as double-stapled colorectal anastomosis. One case submitted to total pelvic exenteration had a concomitant nephroureterectomy. Anterior pelvic exenterations were performed in two cases, being one with sigmoidectomy and primary anastomosis. Four cases were submitted to radical cystoprostatectomy and one case to radical cystectomy since the patient had previously been submitted to hysterectomy. Only one patient received chemoradiationtherapy as neoadjuvant treatment due to an extensive pelvic sarcoma, but there was no objective response.

Operative procedure time ranged from 330 to 760 minutes (mean of 552 and median of 600 minutes). Hospitalization ranged from 9 to 20 days (mean and median of 13 days).

All patients received blood transfusion with a median of 600ml (range from 250ml to 1500ml). Preoperative serum hemoglobin level ranged from 10g/dL to 15g/dL (median of 12.7g/dL). In the postoperative stage, it ranged from 7g/dL to 14.1g/dL (median of 10.9g/dL). Regarding renal function, none of the patients presented a worsened renal function during follow-up.

Two patients had early complications that were conservatively treated: one case of urinary fistula and another of prolonged ileum. One patient was submitted to exploratory laparotomy for lysis of adhesions and drainage of an abscess of the abdominal wall on the 22nd day after surgery.

Six patients presented late complications: three cases with hydronephrosis and five with symptomatic urinary infection; two patients

Table 1 – Primary tumor site, histology, TNM staging system and surgical procedure type in 13 patients with non-transitional cell malignant tumors of the bladder and other pelvic malignancies

Case	Primary site	Histology	TNM	Surgical Treatment	Reconstruction
1	Retroperitoneum	Leyomiosarcoma	T2N0M0	Total pelvic exenteration	“U” neobladder + double stapled colo-anal anastomosis
2	Uterine body	Leyomiosarcoma	T4N0M0/ IVA FIGO	Anterior pelvic exenteration + Sigmoidectomy	Modified Studer neobladder + colo-rectal anastomosis
3	Uterine body	Leyomiosarcoma	T4N0M0/ IVA FIGO	Cystectomy	Modified Studer neobladder
4	Rectum	Adenocarcinoma	T4N2M0	Total pelvic exenteration	Modified Studer neobladder + double stapled colo-anal anastomosis
5	Bladder	Sarcomatoid carcinoma	T0N0M0 *	Cystoprostatectomy	Modified Studer neobladder
6	Rectum	Adenocarcinoma	T4N0M0	Total pelvic exenteration	Modified Studer neobladder + double stapled colo-anal anastomosis
7	Retroperitoneum	Lipossarcoma mixóide	T2N0M0	Total pelvic exenteration Right Nephroureterectomy	Studer Neobladder + double + stapled colo-anal anastomosis
8	Uterine cervix	Squamous cell carcinoma	T4N1M0 / IVA FIGO	Anterior pelvic exenteration	Modified Studer neobladder
9	Bladder	Leyomiosarcoma	T2N0M0	Cistoprostatectomy	Modified Studer neobladder
10	Retroperitoneum	Leyomiosarcoma	T2N0M0	Total pelvic exenteration+ Partial Colpectomydouble	Modified Studer neobladder + stapled colo-anal anastomosis
11	Bladder	Squamous cell carcinoma	T3bN0M0	Cistoprostatectomy	Modified Studer neobladder
12	Bladder	Smal cell Carcinoma	T2N0M0	Cistoprostatectomy	Modified Studer neobladder
13	Rectum	Adenocarcinoma	T4N0M0	Total pelvic exenteration	Modified Studer neobladder + double stapled colo-anal anastomosis

* After trans-urethral resection

presented both complications.

As regards continence, nine out of eleven patients evaluated until the last follow-up and/or death presented daytime continence, eight night-time continence, one light night-time incontinence, and two had retention in self-cleaning intermittent catheterization.

It was not possible to evaluate continence in two patients due to death before three months of follow-up. After six months of follow-up, none of the patients presented day-time incontinence.

Five patients had relapses and three died from disease-related complications: two had retroperitoneal relapse and another had retroperitoneal and distant metastasis. The mean time of relapse was 25 months and median time of 20 months (range 6-71 months) (Table 2).

After 13 months of follow-up, one patient with uterine body sarcoma presented a second transverse colon primary stage I neoplasm. It was not detected any relapse in the urethra region in

cases of locoregional relapse.

Two patients died from treatment-related complications. The first patient had been classified preoperatively as ASA III due to coronary insufficiency and controlled congestive cardiac failure. He died on the 8th day after surgery following clinical complications. The second one died of sepsis on the 13th day following surgery due to central venous catheter infection.

There are currently seven (53.8%) patients alive and disease-free, three died (23.1%) from cancer, and two (15.4%) due to complications following surgery, and one (7.7%) is alive with cancer. One of the patients is alive with no evidence of the disease after being submitted to lung surgery due to rectum adenocarcinoma metastasis.

Overall and cancer-specific survival in the studied group at 24 months and 60 months was 77% and 57%, respectively.

Table 2 - Type of tumor, survival, and current status of patients with recurrence after wide resections and orthotopic ileal neobladder for bladder non-transitional cell malignant tumors and other pelvic malignancies

Histological type	Local	Relapse		Survival (months)	Current status
		Time(months)	Treatment		
Myxoid liposarcoma	Retroperitoneum	8	Palliative radiotherapy	9	Dead
Cervix Squamous cell carcinoma	Retroperitoneum	20	Palliative radiotherapy	24	Dead
Bladder Leiomyosarcoma	Retroperitoneum and liver	18 and 26	Surgery, chemoembolization and chemotherapy	50	Dead
Rectum Adenocarcinoma	Lung	6	Surgery and chemotherapy	38	Alive without disease
Uterus Leiomyosarcoma	Lung, chest wall	70	Chemotherapy and Radiotherapy	81	Alive with disease

Discussion

Urinary reconstruction with ileal conduit, first described by Seiffert⁵ in 1935, became popular thanks to Bricker⁶ in the 1950s. It remains the most used urinary diversion.

In 1950, Gilchirst et al.⁷ described continent diversions which were made popular by Kock et al.⁸ in the 1980s. Several techniques using the cecum, right colon, and ileal end in several configurations have been described. Intestinal detubulization made it possible to obtain reservoirs of high capacity and low pressure, physiologically bladder-like, sparing the upper urinary tract from high pressure.⁹

The era of orthotopic reservoirs was initiated with the possibility of sphincter sparing. The anastomosis of the ileal reservoir in the urethra was proposed by Camey and Le Duc¹⁰ and in the past 15 years the orthotopic reconstruction became the best choice for the reconstruction of the urinary tract for both genders.⁹

Optimal urinary diversion should allow a proper primary neoplasm control with lesser short- and long-term complications.

Classically, orthotopic ileal neobladder is a good alternative for bladder replacement in patients submitted to radical cystectomy due to bladder transitional cell carcinomas. This diversion is particularly advantageous because it causes less psychological, sexual, and self-image impact. Moreover, it also improves the patient's quality of life because it is functionally similar to the physiological one.

For the past 10 years, there has been a change in the paradigm regarding the use of urinary diversion. Similarly to a healthy bladder,¹¹

it allows the renal function to be preserved if obstruction is promptly diagnosed and treated.¹²⁻¹⁴ Current complications in many series are close to ileal conduits', with comparable morbimortality.^{15,16} Therefore, orthotopic reconstruction is now the best option for reconstructing the urinary tract after radical cystectomy.

In the literature, there are a few reports on series of patients submitted to cystectomy due to other advanced primary pelvic malignancies, especially colorectal and gynecological tumors. Early and late complications related to non-orthotopic continent and incontinent urinary diversion ranged from 17% to 26%.^{17,18}

In the current series, patients submitted to radical pelvic exenteration had a primary intestinal reconstruction using double-stapled technique and anal sphincter sparing. Only one patient had been submitted to previous pelvic radiotherapy with a dose of 45Gy. There was no complication regarding rectal stump fistula. In 2000, Husain et al.¹⁹ published a series of 33 patients affected by gynecological neoplasms in which 54% of those submitted to primary rectal anastomosis progressed to fistula of the intestinal anastomosis and needed to undergo another surgery. All of them had been submitted to previous pelvic radiotherapy.

In 2001, Stenzl et al.²⁰ published a series from three reference centers of 102 patients registered from November 1989 to March 1999 submitted to orthotopic neobladder. He reported 21 cases of continent orthotopic ileal diversion. Fifteen were performed for non-transitional cell bladder cancer and six for other pelvic malignancies. It is of note the objective of the study: no involvement of the

remaining urethra. There were three pelvic relapses: two from a primary gynecological tumor and one from a bladder adenocarcinoma. No relapses were related to surgery and occurred far from the urethral anastomosis.

In 2002, Fujisawa et al.²¹ published a series of 35 patients with colorectal primary neoplasm, from which 17 were submitted to radical cystectomy as part of the treatment. Seven of them had urinary tract reconstruction with orthotopic neobladder.

In our series, there were 13 cases from a single institution. Our data suggest that this might be a valuable option for patients submitted to pelvic resections that involve the low urinary tract.

In these malignancies, there is usually no risk of multifocal urothelial cancers such as happen in bladder transitional carcinomas, and this allows the urethra sparing technique to be performed. Attention must be given to possible neurological lesions because of large pelvic surgeries that may involve urinary continence. Considering their significant morbidity and mortality, such a surgery should be performed in specialized centers only.

We believe that the reconstruction of the urinary tract with orthotopic ileal neobladder is an option for patients with pelvic malignancies other than transitional bladder cancer if both principles of oncology surgery and natural history of each neoplasm are considered, as well as anal sphincter-sparing procedure with double-stapled colorectal anastomosis.

In our series, we present a group of patients with different primary tumors who were submitted to total cystectomy. Despite of the different surgical procedures they were submitted to, the likelihood of preserving urinary function was equivalent.

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