

Management of Benign Ureteral Strictures Following Radical Cystectomy and Urinary Diversion for Bladder Cancer

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Purpose: Ureteral obstruction due to benign strictures is a significant complication of radical cystectomy and urinary diversion for bladder cancer that can lead to renal function loss and infection related morbidity. Treatment may be performed surgically or with minimally invasive techniques. We describe the 10-year experience at our department with various treatment modalities for post-cystectomy benign strictures.

Materials and Methods: The study group consisted of 28 patients treated for benign ureteral strictures following radical cystectomy for bladder cancer. Their medical records were reviewed for clinical presentation, diagnostic procedures, treatment and long-term outcome.

Results: The study group represented 12.7% of all 221 patients treated at our department with radical cystectomy for bladder cancer in 1994 to 2004. Ureteral strictures were asymptomatic in 71.4% of cases. Median time to diagnosis was 7.0 months and 75% of the patients were diagnosed within year 1 after cystectomy. Treatment consisted of stenting, dilation and open surgical revision with removal of the strictured segment and reanastomosis. Median followup was 62.5 months. The stenting procedures served as the long-term definitive treatment in 45% of cases, whereas balloon dilation uniformly failed. Although open surgical revision was technically challenging, it had a long-term success rate of 93%.

Conclusions: Benign ureteral strictures commonly occur during postoperative year 1 and they are usually asymptomatic. Early diagnosis and prompt drainage are required to prevent consequent renal parenchymal loss and infectious complications. Although minimally invasive procedures are viable treatment alternatives, open surgical revision is still the preferred long-term definitive treatment.

Key Words: ureter, bladder, urinary diversion, cystectomy, ureteral stricture

Ureteral strictures occur in 2% to 10% of patients after radical cystectomy and urinary diversion for bladder cancer. They are usually located at the uretero-enteric anastomosis, commonly involve the left ureter and, if left untreated, they can lead to renal function loss and infection related morbidity.¹⁻⁵ Traditionally the only management option was surgical revision and reanastomosis. However, postoperative adhesions make reoperation technically challenging with potential related morbidity. Recently due to advancements in invasive radiology and endourology percutaneous imaging guided procedures and endoscopic techniques have been proposed as reasonable treatment alternatives.⁶ In a previous report we described our experience with retrograde insertion of nephro-uretero-conduit stents in select patients with ureteral strictures after radical cystectomy and urinary diversion.⁷ This technique served as definitive treatment in 75% of patients who were followed a median of 26 months.

In the current study we extended our study group to include all patients treated for benign ureteral strictures following radical cystectomy at our center with surgical revision or minimally invasive techniques with longer fol-

lowup. Based on our experience we propose a management algorithm for diagnosis and treatment.

MATERIALS AND METHODS

We reviewed the charts of the 221 patients who underwent radical cystectomy and urinary diversion for bladder cancer at our institute from 1994 to 2004 and identified those who were treated subsequently for ureteral strictures. The diagnosis of ureteral obstruction was made at regular clinic followup visits or during evaluation of clinically evident UTI.

Our institutional followup protocol after radical cystectomy consists of clinic visits 3 weeks, and 3, 6 and 12 months after surgery, every 6 months up to 3 years and yearly thereafter. Each visit includes a history, physical examination, serum creatinine measurement, urine cytology and imaging. Ureteral stricture was suspected in the event of unexplained flank pain, increased serum creatinine or febrile UTI. In other cases it was an incidental finding on routine US or CT. Additional studies (excretory urography, dynamic renal scan, antegrade nephrostography or loopography) were performed according to surgeon preference to confirm diagnosis and localize the stricture. Upper tract tumor recurrence and external ureteral compression due to metastases as a cause for obstruction were ruled out by CT and ipsilateral urine cytology. Treatment modalities in-

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cluded PCN for primary decompression of the obstructed collecting system, followed by antegrade nephro-uretero-conduit stent insertion, as previously described by our group,⁷ DJ stent insertion, balloon dilation or open surgical revision with excision of the strictured ureteral segment and reanastomosis. The decision regarding the preferred treatment modality was based on general patient medical condition, the need for further oncological adjuvant therapy, and surgeon and patient preference.

RESULTS

Of the 221 patients who underwent radical cystectomy and urinary diversion during the study period 30 had ureteral obstruction postoperatively. Two patients were excluded from analysis because obstruction was caused by external compression due to abdominal metastases. None of the patients had ureteral obstruction due to intraluminal tumor recurrence. The final study group consisted of 28 patients (32 renal units) for a 12.7% incidence of benign ureteral strictures. The stricture incidence by diversion type was 13.7% for ileal conduit diversion and 10.3% for orthotopic neobladder diversion ($p > 0.05$).

The table lists patient characteristics. Median age at radical cystectomy was 70.4 years (range 33.1 to 83.3). Overall median followup after cystectomy was 62.5 months (range 5.0 to 144.0) and the median interval from radical cystectomy to stricture diagnosis was 7.0 months (95% CI 1.9–12.1, range 0.3 to 89.4). In 21 cases (75%) the diagnosis was made within postoperative year 1 (fig. 1). Strictures were asymptomatic in 20 patients (71.4%). In all patients initial US or CT revealed new onset hydronephrosis or progressive dilatation of a preoperatively dilated collecting system.

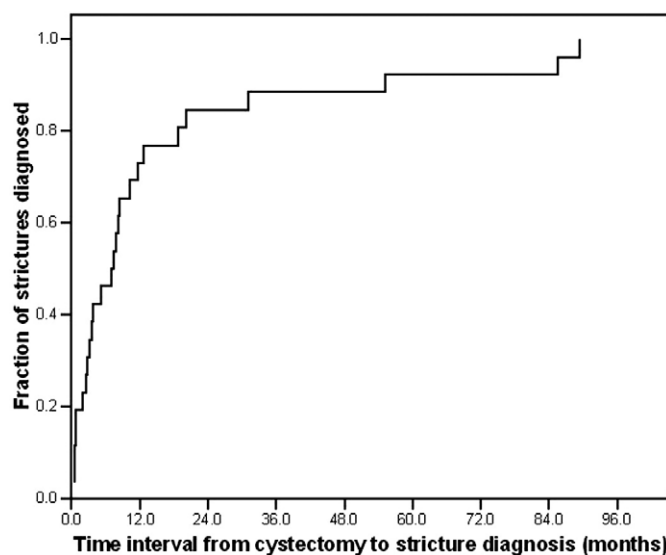


FIG. 1. Kaplan-Meier curve of ureteral stricture time course

Stricture management varied considerably due to the retrospective nature of the study. In 4 cases the stricture was diagnosed late, after renal damage had occurred, as evident on renal isotope scan. The end result of delayed treatment was renal atrophy in all cases. Figure 2 shows management details of the remaining 28 renal units, which were diagnosed and treated early.

PCN insertion for primary decompression of the obstructed renal unit was uniformly successful. PCN insertion was the only treatment in 1 patient with overwhelming sepsis, who died 14 days later. In all remaining cases PCN insertion was followed by minimally invasive treatments (stenting or balloon dilation) or by surgical revision.

In 26 cases further treatment was initially based on minimally invasive modalities. Nephro-uretero-conduit stent insertion was successful in 17 of 18 attempts (94.7%). In 1 of 17 cases the nephro-uretero-conduit stent was converted to a DJ stent due to recurrent stent migration. In 10 of 17 patients the nephro-uretero-conduit stent remained as the definitive treatment. In 7 cases stenting was successful with an ongoing periodical stent exchange every 3 months. However, in 3 cases progressive renal function deterioration leading to renal atrophy occurred and 1 patient eventually underwent nephrectomy of the nonfunctioning kidney due to recurrent pyelonephritis. Overall of 17 patients in whom a nephro-uretero-conduit stent was inserted it served as a successful long-term solution in only 7 (41%).

DJ stent insertion was the initial treatment after decompression by PCN in 3 cases. In 1 patient it served as definitive treatment, while the remaining 2 underwent surgical revision. In 5 patients with left stricture and 1 with right stricture balloon dilation was attempted and in the patient with left stricture there were 3 repeated attempts. However, stricture recurred in all cases. Surgical revision was performed in 5 cases and an indwelling permanent PCN was left in the remaining case. None of the patients was treated with endoscopic incision in the present series.

For all stenting procedures (DJ or nephro-uretero-conduit stent) the long-term success rate was 45% (9 of 20 patients). Significant complications of the stenting procedures included renal function deterioration in 3 cases, a retained

Study group characteristics	
	No. Pts (%)
Overall	28
Sex:	
M	26 (92.9)
F	2 (7.1)
Pathological stage:	
pT0	1 (3.5)
pT1	7 (25.0)
pT2	8 (28.6)
pT3	8 (28.6)
pT4	4 (14.3)
Lymph nodes:	
Neg	20 (71.4)
Pos	8 (28.6)
Diversion type:	
Ileal conduit	21 (75.0)
Studer orthotopic neobladder	5 (17.9)
Ileocolonic orthotopic neobladder	2 (7.1)
Anastomosis type:	
Bricker	26 (92.9)
Wallace	2 (7.1)
Presentation:	
Incidental finding on imaging	10 (35.7)
Renal failure	10 (35.7)
UTI/urosepsis	7 (25.0)
Flank pain	1 (3.6)
Side affected:	
Lt	19 (67.9)
Rt	5 (17.9)
Bilat	4 (14.3)
Strictured segment:	
Proximal ureter	3 (10.7)
Distal ureter/ureteroenteric anastomosis	25 (89.3)

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