



Abstract

Introduction and Objectives: Hydronephrosis is a common complication associated with radical cystectomy and urinary diversion (UD) for bladder cancer. Temporary hydronephrosis in early postoperative period is commonly resolved simultaneously within 3 to 6 months, whereas persistent hydronephrosis needs treatment. Besides benign ureteral stricture, ureteral recurrence of urothelial carcinoma can cause hydronephrosis. They are often difficult to differentiate in clinical settings. Moreover, benign ureteral stricture is often refractory to minimally invasive treatment and needs open surgical revision (OSR). In this study, we aimed to verify our management for hydronephrosis after radical cystectomy and urinary diversion for bladder cancer.

Methods: Between 2001 and 2017, 35 patients developed hydronephrosis after UD with no apparent findings suggestive of upper urinary tract recurrence on computed tomography. Of them, ileal conduit and ileal neobladder had been performed in 23 (65.7%) and 12 (34.3%), respectively. To differentiate malignancy from benign stricture, antegrade ureteroscopy (AUS) was performed. After ruling out malignancy, balloon dilation (BD) was performed in those with the length of stricture <1cm. In those with the length of stricture ≥1cm or failed dilation, open surgical revision (OSR) was considered.

Results: Ureteral recurrence was detected by AUS in 4 (11.4%). Of the remaining 31 patients, malignant stricture was eventually revealed in 3 patients. As a result, diagnostic accuracy was 91.3%. Median time to onset of hydronephrosis was 4 (IQR 1.8-7.5) and 22 months (IQR 11.5-59.0) in benign and malignant stricture, respectively (p=0.0036). Although BD was performed in 12 patients with benign stricture, BD was successful only in 3 (25.0%). On the other hand, OSR was performed in 11 patients including 4 with failed BD, all of which were successful. The remainder included 11 managed with nephrostomy, 3 receiving nephrectomy due to impaired function and 1 with permanent stent insertion.

Conclusions: Onset of hydronephrosis within one year suggests benign stricture and AUS may be useful to determine the etiology. BD has a low success rate, whereas OSR is highly effective to treat benign stricture.

Background & Purposes

Background

- Hydronephrosis is a common complication associated with radical cystectomy and urinary diversion (UD) for bladder cancer.
- The incidence is around 10% [1-4].
- Hydronephrosis after UD is caused by ureterointestinal stricture and recurrence of urothelial carcinoma in the ureter.
 - The differentiation is often difficult.
- Treatment for benign stricture
 - Endourologic procedure is favorable; however, some cases need open revision.

Purposes

- To verify our management for hydronephrosis after radical cystectomy and urinary diversion for bladder cancer.

Materials & Methods

Patients

- Between 2001 and 2017, 35 patients developed hydronephrosis after UD with no apparent findings suggestive of upper urinary tract recurrence on computed tomography.
 - Ileal conduit, 23 patients (65.7%)
 - No cases with Wallace procedure for ureteroileal anastomosis.
 - Ileal neobladder, 12 patients (34.3%).

Diagnostic and therapeutic approach

- Antegrade ureteroscopy and ureterography were performed to rule out ureteral cancer and measure the length of stricture.
- In case with no evidence of malignancy
 - Length of stricture <1 cm and guide wire can pass: balloon dilation was performed.
 - Length of stricture ≥1 cm or failed dilation: open surgical revision was considered.

Assessment of outcome

- Clinical chart was reviewed retrospectively.

Statistical analysis

- Time to onset of hydronephrosis was compared using the Mann-Whitney *U* test between malignant and benign stricture.

Results

Fig 1. Summary of diagnosis and treatment

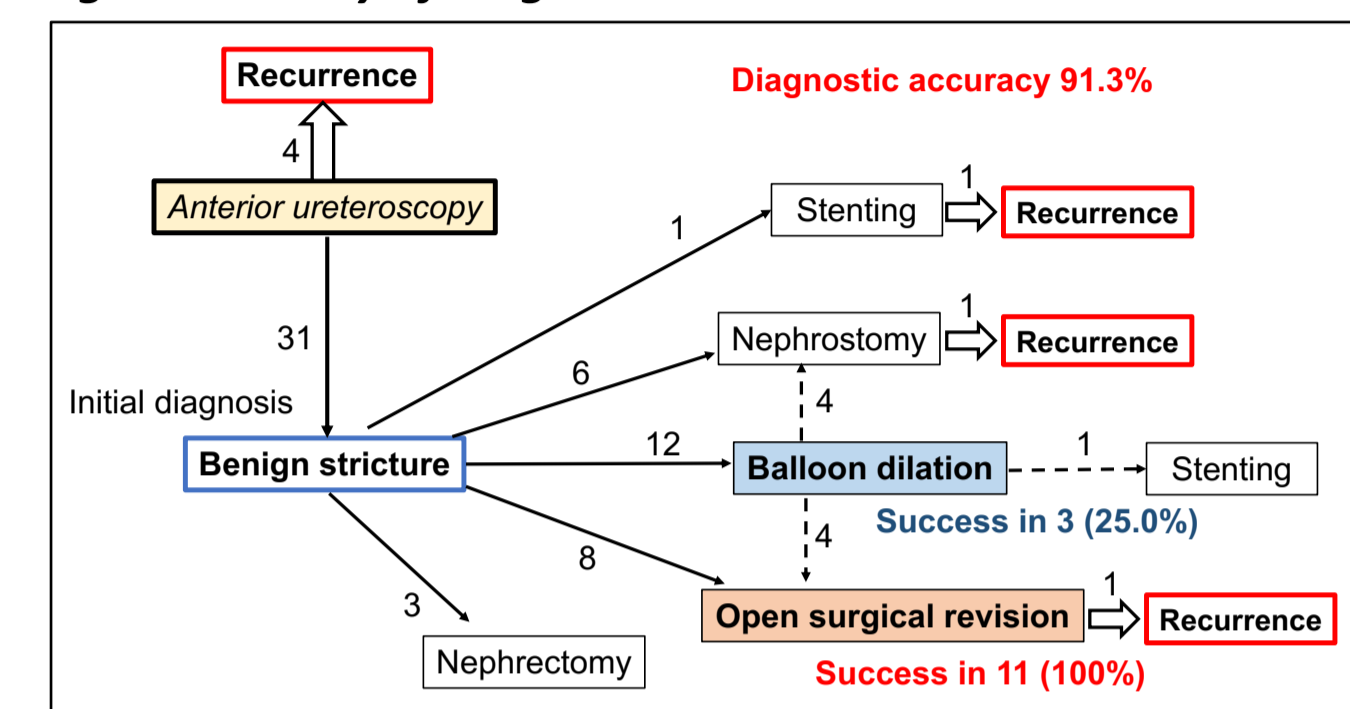


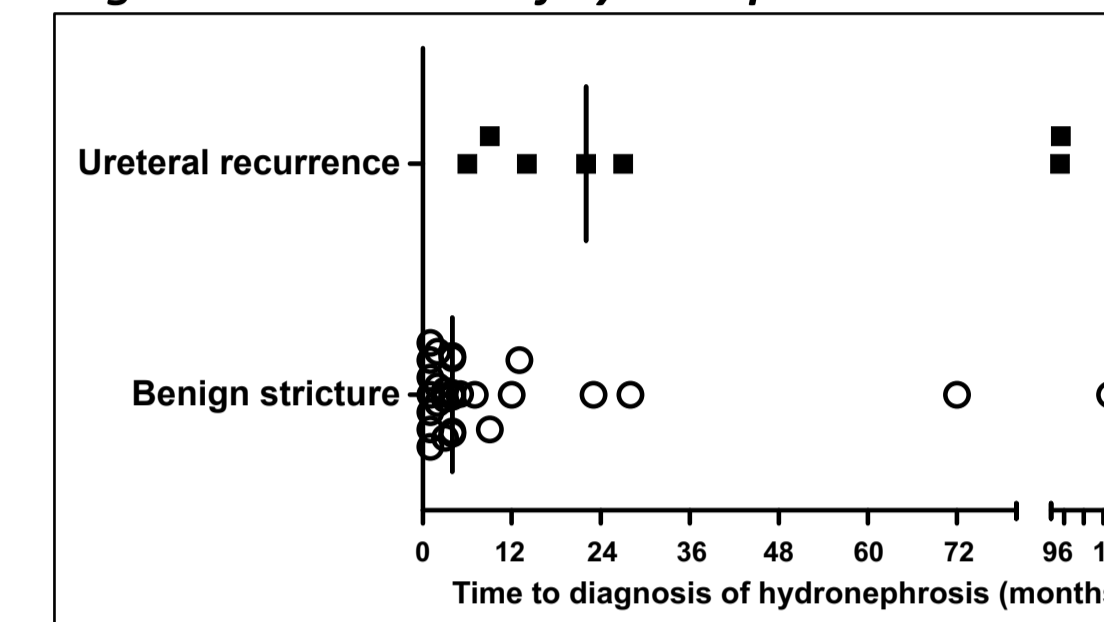
Table 1. Characteristics of patients with inaccurate initial diagnosis

	Patient 1	Patient 2	Patient 3
Type of diversion	Ileal neobladder	Ileal conduit	Ileal conduit
Time to diagnosis	92	6	22
Pathological stage	T2, N0	T4a, N2	T2, N0
Ureteroscopic biopsy	done	done	not done
Initial treatment	Balloon dilation (failed)	Balloon dilation (failed)	open revision
Pattern of disease recurrence	Periureteral recurrence, distant metastasis	Periureteral recurrence, retroperitoneal dissemination	Intraureteral recurrence

Discussion

- Recurrence in the upper urinary tract occurs in 1.8-6.0% in patients undergoing cystectomy commonly 25-40 months after postoperatively [5,6], whereas benign stricture occurs in about 10% commonly within 1 year postoperatively [1-4].
- Balloon dilation for benign ureteroileal anastomotic stricture
 - The reported success rates are 0-26% [1,7,8].
 - Stricture ≤1cm is thought to be a good indication [7].
 - Salvage therapy for failed cases include ureteral catheterization and nephrostomy besides open revision [1,8].
- Open revision for benign ureteroileal anastomotic stricture
 - The reported success rates are as high as 91-100% [1,7-9].
 - However, high technical skills are required and high morbidity accompanies [9].
- Results of this study are in accord with those in other reports.
- Our diagnostic strategy may be valid although periureteral recurrence is difficult to detect.

Fig 2. Time to onset of hydronephrosis



Median time to onset of hydronephrosis was 22 months (IQR 11.5-59.0) and 4 (IQR 1.8-7.5) in malignant and benign stricture, respectively (p=0.0036).

Table 2. Outcomes of open revision for benign stricture

n=11		
Urinary diversion	Ileal conduit	6 (54.5%)
	Ileal neobladder	5 (41.7%)
Reconstruction side	Left	3 (27.3%)
	Right	2 (18.2%)
	Bilateral	6 (54.5%)
Operation time, min (range)	353 (182-553)	
Amount of blood loss, ml (range)	470 (80-1620)	
Adjacent organ injury	2 *(18.2%)	

*intestine and large vessel, respectively

References

- Tal R et al. Management of benign ureteral strictures following radical cystectomy and urinary diversion for bladder cancer. *J Urol* 178:538,2007
- Msezane L et al. Open surgical repair of ureteral strictures and fistulas following radical cystectomy and urinary diversion. *J Urol* 179:1248,2008
- Large MC et al. The impact of running versus interrupted anastomosis on ureterointestinal stricture rate after radical cystectomy. *J Urol* 190:923,2013
- Hautmann RE et al. Preoperatively dilated ureters are a specific risk factor for the development of ureteroenteric strictures after open radical cystectomy and ileal neobladder. *J Urol* 198:1098,2017
- Volkmer BG et al. Upper urinary tract recurrence after radical cystectomy for bladder cancer--who is at risk? *J Urol* 182:2632,2009
- Takayanagi A et al. Upper urinary tract recurrence after radical cystectomy for bladder cancer: incidence and risk factors. *Int J Urol* 19:229,2012
- Schondorf D et al. Ureteroileal strictures after urinary diversion with an ileal segment-is there a place for endourological treatment at all? *J Urol* 190:585,2013
- Ahmed YE et al. Natural history, predictors and management of ureteroenteric strictures after robot assisted radical cystectomy. *J Urol* 198:567,2017
- Packiam VT et al. Lessons from 151 ureteral reimplantations for postcystectomy ureteroenteric strictures: A single-center experience over a decade. *Urol Oncol* 35:112e19,2017