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TRAUMA AND RECONSTRUCTIVE UROLOGY

Endoscopic treatment of stenotic ureteral orifices using self-expanding metallic stents: comparison of two methods and evaluation of effectiveness and safety in a tertiary center

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Introduction Ureterovesical orifice stricture (UOS) is a rare complication after bladder or pelvic floor treatment, usually related to oncological etiology. To date, the literature has not established the optimal treatment for UOS.

Material and methods In a retrospective, single-center study, we present our experience in endoscopic treatment of 15 patients with narrowed or totally closed bladder ureteral orifices. In the study group, dilatation or resection of the stricture was performed, followed by implantation of a self-expanding stent (SUS). Dilatation and resection of the stricture were assessed for efficacy and safety.

Results In the group in which UOS was treated by resection and SUS implantation, 75% full therapeutic success was noted, i.e. obtaining a patent ureter after completion of urinary tract stenting. No serious complications (Clavien-Dindo >3a) occurred in the group where resection of the UOS was performed, in contrast to the group treated by dilatation of the UOS (serious complications in 57.2%).

Conclusions Resection of stenotic ureteral orifice tissues seems to be a more effective treatment method than their dilatation. Self-expanding stents may be a useful option in the treatment of ureteral orifice strictures, but it is necessary to perform studies comparing their safety and effectiveness with DJ stents.

Key Words: ureteral orifice stricture ‹› closed ureteral orifice ‹› narrowed ureteral orifice ‹› endoscopy ‹› self-expanding stents ‹› Allium ‹› metal ureteral stents ‹› bladder cancer ‹› resection of ureteral orifice ‹› transurethral resection of bladder tumor (TURBT) ‹› dilatation of the ureteral orifice

INTRODUCTION

The incidence of postoperative narrowing of the ureterovesical orifice following transurethral resection of bladder tumor (TURBT) procedures is approximately 3%. Location of the tumor in the bladder trigone has been identified as a risk factor [1, 2]. No standard treatment has been developed so far for ureterovesical orifice stricture (UOS). The literature on this topic is limited to case reports and small study groups. The two largest studies suggest that endoscopic procedures are the first choice of treatment [2, 3]. If endoscopic treatment proves ineffective, ureteral bladder reimplantation can be performed. However, it should be emphasized that the oncological outcomes take priority, so reconstructive surgery should be postponed until complete bladder cancer resection is achieved and no recurrence is observed in follow-up. Metallic stents introduced on the urological market are

promising tools which can improve endoscopic results in treatment of ureteral strictures. There are three types of self-expanding stents (SUS) available on the urological device market: thermoexpandable Memokath stents, three-layer Uventa stents, and Allium URS stents.

MATERIAL AND METHODS

Study population and treatment method

In this retrospective, single-center study, we analyzed 15 patients with UOS treated in 2022–2025 endoscopically using the Allium URS SUS. Procedures were analyzed in terms of safety and efficiency.

In our center, endoscopic placement of the SUS is considered a treatment of choice for ureteral strictures. Initial endoscopic evaluation of the ureteral stricture, in our opinion, allows for a proper diagnosis in relation to its length and character. We chose to use the SUS instead of DJ stents after stricture dilatation as we see higher potential for healing ureteral strictures with this method due to the higher radial force exerted on the stricture by the SUS than by DJ stents. If the SUS-assisted endoscopic treatment fails, procedures such as reconstructive surgery or permanent renal decompression with the DJ stent or nephrostomy tube are considered.

The study included patients with UOS following previous treatment. If hydronephrosis after previous treatment was diagnosed, patients were first managed with kidney decompression using a DJ stent or nephrostomy tube. After kidney decompression, patients were scheduled for elective endoscopic treatment. The UOS was treated by endoscopic dilatation or endoscopic resection of the stricture with SUS implantation after dilatation or resection. According to the Allium URS SUS manufacturers, dilatation of the UOS to a diameter of 14 F was a condition to perform the SUS implantation. The purpose of Allium URS SUS implantation is to exert pressure on the newly forming scar, thus preventing formation of a tight stricture in the previously widened place. This mechanism is achieved through the design of the Allium URS SUS, which, when released from the delivery system (and in the absence of external barriers), opens to a diameter of 27–30 F.

Stricture dilatations on 7 patients were performed between June 2022 and June 2023. From June 2023, dilatations were replaced by resections of the UOS because we assessed the effectiveness of treatment and safety of patients as better. Eight patients with UOS were treated with resection of the stricture. Stricture length was measured during surgery in ureteropyelography and confirmed after stent implantation. Strictures longer than 2 cm and strictures secondary to radiotherapy were defined as "complicated strictures." The scheduled time of stenting for the dilatation group was 1 year, which was related to the manufacturer's recommendations, and studies on scar remodeling in the urinary tract system [4–6]. In the resection cases, the stenting time was shortened to 3 months, but not shorter than 6 weeks, which was related to the higher rate of stent migration 3 months after its implantation and as well as optimal time for performing a safe reTURBT procedure, as defined by the European Association of Urology (EAU) guidelines [7, 8]. The full follow-up time of all study groups is presented in Table 3. During the follow-up, patients routinely underwent ultrasound examination every 6 months, and renal scintigraphy every year. Full renoscintigraphy follow-up was obtained in 46% of patients; however, all the patients with ultrasound hydronephrosis underwent a furosemide renoscintigraphy test to check if there was significant renal outflow blockage after stent explantation. Treatment was considered a "full therapeutic success" if, during follow-up, there was no evidence of tight stenosis in the renoscintigraphy furosemide test and no hydronephrosis in the ultrasound after SUS extraction. The minimal follow-up time after stent explantation was 1 month, and mean follow-up was 20 months. Hydronephrosis was measured in ultrasound, and its presence was reported in the modified Society of Fetal Urology Grading, defining the first grade of ultrasound hydronephrosis as significant (calices >3 mm and renal pelvis >5 mm). Tolerability was assessed using an author-developed quality of life (QoL) questionnaire during outpatient visits; no validated QoL questionnaires were used. The questionnaire assessed pain and daily functioning in four questions (5 points for each question, 4–20 points, 20 points meant complete lack of discomfort and lack of awareness of the SUS presence, 4 points meant pain and discomfort worse every day than with previous stenting methods). Improvement in both parameters and >10 points was considered as improvement in QoL.

Further management in the case of the SUS treatment failure was considered individually, including reconstructive surgery, nephrectomy, DJ/nephrostomy stenting or retreatment using the SUS.

The endpoint of the study was to determine the features influencing the success of SUS-assisted endoscopic treatment of UOS.

Surgical technique

All the SUS implantations and explantations were performed by the same surgeon. Implantation of the SUS was carried out in three stages: identification of the stricture, dilatation or resection of the stricture, and SUS implantation (Figure 1A, B). In dilatation cases after placement of two hydrophilic guidewires, dilatation of the stricture was conducted using a ureterorenoscope 7/9.5 F (URS). Such dilatation was performed under fluoroscopy and URS vision. Further dilatation was performed using COOK disposable ureteral dilatators under fluoroscopy. The desired diameter of dilatation was 14 F. In resection cases, if a DJ stent was present, it was removed, and ascending pyelography was performed through a ureteral catheter. After confirming the length of the stricture, a metal wire was inserted, and tissue resection was performed up to the retrovesical segment of the ureter. If there was no DJ stent but a nephrostomy tube, descending pyelography was performed. This scenario was most common in a totally closed ureter orifice. Resection of the closed ureter was performed, and, after obtaining the lumen of the ureter, the hydrophilic guidewire was placed into the ureter. Resection was performed using a bipolar resection loop. Implantation of the SUS was performed under C-arm guidance after previously marking the stricture using metal markers placed on the patient. The SUS was positioned to cover the stricture with the distal end inserted approximately 3–4 cm into the bladder lumen. This position of the SUS facilitates removal of the SUS and helps prevent irritative symptoms in the bladder triangle. Two sizes of the Allium URS SUS were used: 12 cm, 10 F and 20 cm, 9 F. During the SUS explantation procedure, a DJ stent was placed for 1 month due to the swelling of the ureter and the presence of blood clots in its lumen. After 1 month, the DJ stent was removed. All removal procedures were carried out using cystoscope optical forceps.

Table 1. *Characteristics of the patients and strictures*

Variable	Total (n = 15)	Dilatation (n = 7)	Resection (n = 8)
	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)
Age [years]	66 ±11.77	64.14 ±12.73	67.63 ±11.48
Sex (male/female)	7 / 8	1 / 6	6 / 2
Ureter (left / right)	7 / 8	1 / 6	6 / 2
Iatrogenic stricture	15 (100%)	7 (100%)	8 (100%)
Stricture secondary to stone treatment (ureteroscopic lithotripsy, URSL)	3 (20%)	1 (14.3%)	2 (25%)
Stricture secondary to bladder tumor treatment (TURBT)	4 (26.7%)	1 (14.3%)	3 (37.5%)
Stricture secondary to radiotherapy	6 (40%)	3 (42.9%)	3 (37.5%)
Other (ureter reimplantation, myomectomy)	2 (13.3%)	2 (28.5%)	0 (0%)
Stricture length [cm] <1 cm 1–2 cm >2 cm	7 (46.7%) 4 (26.7%) 4 (26.7%)	3 (42.8%) 2 (28.6%) 2 (28.6%)	4 (50%) 2 (25%) 2 (25%)
Complicated stricture (longer than 2 cm and/or after radiotherapy)	7 (46.7%)	4 (57.1%)	3 (37.5%)
Decompression by nephrostomy before treatment	9 (60%)	3 (43%)	6 (75%)

M – mean; SD – standard deviation; n – sample size; MD – median IQR – interquartile range

Statistical analysis

Statistical analyses were conducted using SPSS 27.0.1.0. Depending on variable distribution, continuous were reported using means ±standard deviations (SDs) or medians and interquartile ranges (IQR). Categorical variables were presented as counts and percentages (%). No direct comparison between cohorts was conducted due to insufficient statistical power resulting from the small sample size.

Bioethical standards

The study was approved by the Collegium Medicum Ethics Committee in Bydgoszcz (approval: No. KB257/2024). The study complies with the AGREE reporting checklist protocol.

RESULTS

All patients in the cohort had iatrogenic ureteral strictures, i.e., following prior treatment of the small pelvis or bladder (Table 1). The length of the UOS in the study group did not differ significantly between groups (Table 1). In the group in which UOS resection was performed, the percentage of patients who underwent radiotherapy was lower, while the percentage of patients with a nephrostomy tube was higher (75%), which was due to the complete ureteral orifice closure (Table 1). Patients with a nephrostomy tube in the dilatation group had a narrowed ureteral orifice without

complete closure; however, nephrostomy was placed in this group due to significant symptoms of infection with concomitant urinary retention (Table 1). The procedure time was longer in the resection group, which was associated with a more technically challenging procedure. In the case of complete ureteral orifice closure, it was necessary to excise the closed orifice tissues, which was performed without a safety guidewire (Table 2). The shorter stenting period in the resection group was associated with a higher tendency for SUS migration 3 months after its insertion. Explantation before the scheduled time was associated with SUS migration in 8 out of 9 cases; in 1 case, earlier removal was caused by dysuria due to irritation of the bladder trigone by the SUS (Table 2). No significant differences were found in creatinine levels before, during, and after stenting. This observation was confirmed by renal scintigraphy in 46% of the patients. No deterioration of renal function after treatment was observed (Table 3). Serious complications, including death, occurred only in the group of patients who underwent dilatation. In this group, the treatment failure rate was significantly higher than in the group in which the UOS was resected (Table 4). All complications were related to infections secondary to urinary retention during stenting and the need for renal decompression via a DJ stent or nephrostomy tube. Furthermore, it should be noted that QoL during stenting in the dilatation group was

Table 2. *Characteristics of endoscopic procedure*

	Total (n = 15)	Dilatation (n = 7)	Resection (n = 8)
	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)
Implantation time [min]	39.67 ±21.25	34.29 ±12.73	44.38 ±24.85
Explantation time [min]	13.64 ±8.67	14.00 ±4.183	13.33 ±11.69
Possible dilatation diameter over 14F	14 (93.3%)	6 (85.7%)	8 (100%)
Time of stenting [months]	5 (1–20)	14 (4–20)	4.28 ±1.79
Necessity of explantation before scheduled time	6 (40%)	3 (42.9%)	3 (37.5%)
Migration of stent	5 (33.3%)	3 (42.9%)	2 (25%)
Uncoiling of the stent during explantation	1 (6.67%)	1 (14.28%)	0 (0%)
Explantation using a cystoscope	15 (100%)	7 (100%)	8 (100%)

M – mean; SD – standard deviation; n – sample size;
MD – median IQR – interquartile range

Table 3. *Functional, ultrasound, and follow-up outcomes*

Variable	Total (n = 15)	Dilatation (n = 7)	Resection (n = 8)
	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)
Creatinine before stenting	0.96 ±0.19	0.94 ±0.22	0.98 ±0.18
Creatinine during stenting	1.01 ±0.22	0.97 ±0.30	1.03 ±0.15
Creatinine after stenting	1.06 ±0.19	1.06 ±0.22	1.06 ±0.22
Renoscintigraphy [GFR] (before stenting)	33.71 ±9.71	31.20 ±10.45	40.00 ±4.24
Renoscintigraphy [%] (before stenting)	47.25 ±7.85	44.20 ±7.46	52.33 ±6.51
Renoscintigraphy [GFR] (during stenting)	25.57 ±12.09	21.00 ±11.11	37.00 ±4.24
Renoscintigraphy [%] (during stenting)	39.89 ±6.53	38.50 ±6.19	42.67 ±7.57
Renoscintigraphy [GFR] (after stenting)	29.75 ±12.01	26.33 ±12.10	35.00 ±2.83
Renoscintigraphy [%] (after stenting)	33.00 ±5.41	33.67 ±6.43	39.67 ±11.50
Hydronephrosis during stenting	6 (40%)	4 (57.1%)	2 (25%)
Hydronephrosis after stenting < 2 months	7 (46.7%)	5 (71.1%)	2 (25%)
Hydronephrosis after stenting 12–24 months	6 (40%)	4 (57.1%)	2 (25%)
Follow-up time [months]	20 (1–48)	24 (18–48)	9 (1–48)

M – mean; SD – standard deviation; n – sample size;
MD – median IQR – interquartile range

Table 4. *Complications and treatment outcomes*

Variable	Total (n = 15)	Dilatation (n = 7)	Resection (n = 8)
	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)	M ±SD / n (%) / MD (IQR)
Serious complications (Clavien-Dindo >3a)	4 (26.7%)	4 (57.2%)	0 (0%)
Number of complications 3A	3 (20%)	3 (42.9%)	0 (0%)
Number of complications 3B	0	–	–
Number of complications 4A	0	–	–
Number of complications 5	1 (6.7%)	1 (14.3%)	–
Better quality of life during stenting	11 (73.3%)	4 (57.1%)	7 (87.5%)
Full therapeutic success	8 (53.3%)	2 (28.6%)	6 (75%)

M – mean; SD – standard deviation; n – sample size;
MD – median IQR – interquartile range

worse than in the group in which the UOS was resected (Table 4).

DISCUSSION

The effectiveness of endoscopic treatment of the UOS may vary between 70 and 90% [1–3]. Progression of bladder cancer is a well-confirmed factor influencing the effectiveness of treatment. Additionally, bladder function, adjuvant radiotherapy, and follow-up time should be considered as factors influencing the treatment results. The method of treatment of UOS in our study cohort evolved from dilatation to resection. The first cases were treated by dilatation according to the recommendations of the manufacturer of the Allium URS SUS. After the first 7 cases of UOS treated by dilatation, 2 patients with total closure of the ureteral orifice were scheduled for SUS-assisted endoscopic treatment. Due to the lack of possibility to insert a guidewire, dilatation was impossible, and resection was necessary to restore patency of the ureter. Better treatment outcomes in these 2 patients who underwent resection of stenotic tissues resulted in continuing treatment with resection of the UOS. As a result, two groups of patients were identified. In the group treated with UOS dilatation, we observed a higher percentage of patients undergoing radiotherapy and, overall, with complicated strictures. This could have an influence on worse treatment outcomes in this group, as the recurrence of ureteral strictures after radiotherapy is higher secondary to tissue ischemia and fibrosis [9]. The safety of resection procedures without a safety guidewire may be questionable; therefore, the procedure should be performed as quickly as possible to prevent the introduction of large amounts of irrigation fluid into the retroperitoneal space. It is helpful to use a contrast mixed with methylene blue during closed ureteral orifice resection under fluoroscopic guidance. Resection of the closed orifice was performed during continuous C-arm X-ray

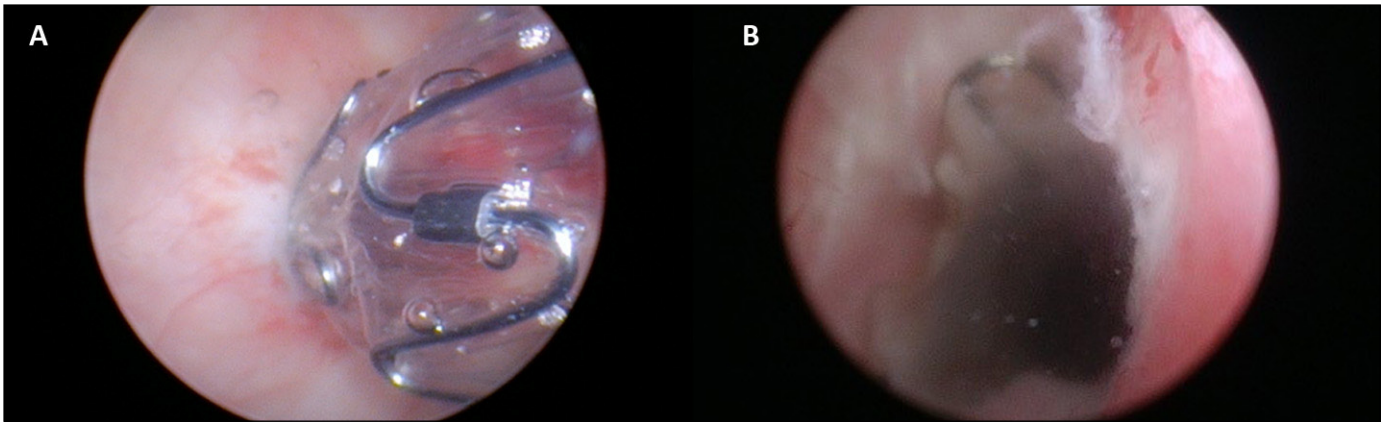

Figure 1. *Endoscopic view of a narrowed ureteral orifice after* **A)** *dilatation and* **B)** *resection, showing the self-expanding ureteral stent.*

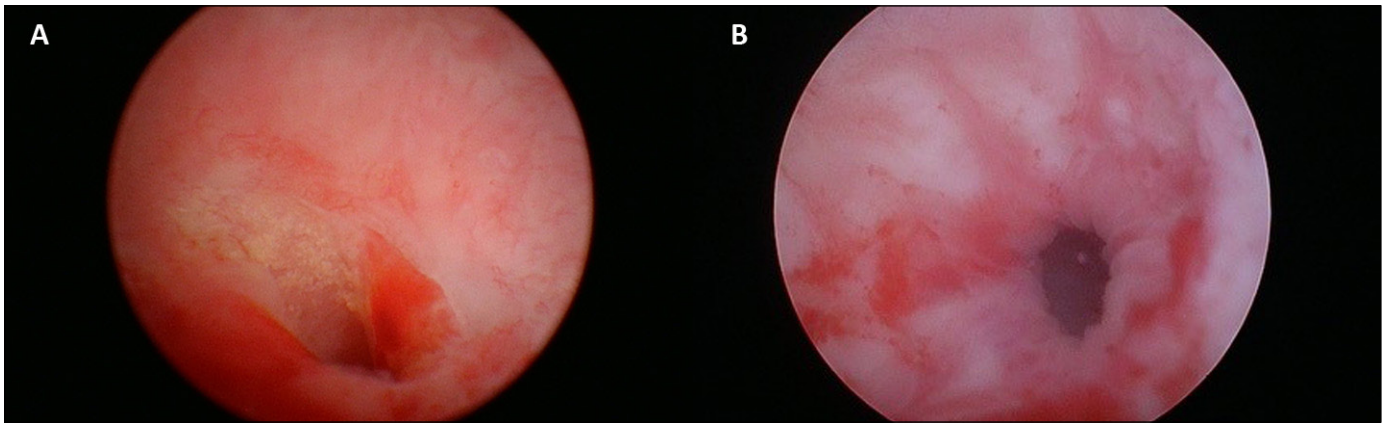

Figure 2. *Endoscopic view of a treated ureterovesical orifice stricture 3 months after self-expanding ureteral stent explantation where* **A)** *ureterovesical orifice stricture was dilatated, and* **B)** *UOS was resected.*

projection. In our experience, all the totally closed ureter orifices were successfully unblocked using the mentioned method. However, in cases of a prolonged procedure, we considered terminating the endoscopic procedure and reimplanting the ureter laparoscopically. As regards the surgical technique, the end of the SUS should not be left directly in the ureteral orifice, as this may cause migration of the SUS into the ureter, which may result in difficulties during SUS removal. In our experience, it is best to insert the SUS approximately 3–4 cm into the bladder lumen, as this usually does not irritate the trigone (the SUS end bends towards the central part of the bladder without touching the trigone). Leaving the appropriate length of the SUS in the bladder lumen allows the use of cystoscopic forceps, which significantly facilitates SUS removal, as it is possible to apply a greater pulling force than with URS forceps.

The death of a patient during stenting was caused by urosepsis and multi-organ failure. The patient was evaluated by a urologist in the emergency department due to urinary retention in the kidney and signs of a urinary tract infection. The patient was in the sixth month of stenting. Because of the suspicion of SUS occlusion, the patient was deemed eligible for renal decompression and delayed replacement of the SUS. The patient refused the proposed treatment, arguing that the previous incident of SUS occlusion and spontaneous expulsion of a protein conglomerate had led to the SUS unblocking. The patient was admitted to the Urological Department. The next day, the patient's condition deteriorated significantly. A nephrostomy tube was placed, revealing pus and gas from the kidney pelvicalyceal system. Despite renal decompression and broad-spectrum antibiotic therapy, the patient developed septic shock, complicated by multi-organ failure and death. This tragic case emphasized the importance of urological consultation if symptoms of urinary tract infection develop during stenting. Therefore, shortly after this incident, we changed the UOS procedure from dilatation to scar tissue resection, which reduced the number of complications, improved QoL, and ultimately resulted in complete resolution of the UOS in 75% of patients.

The main limitation of the study is the small number of patients with unrepresentative numbers of most subgroups to perform appropriate statistical analysis. The study has typical limitations due to its retrospective, single-center design, which limits its control over sampling of the population as well as the nature and quality of the predictor variables. Additionally, the different follow-up times in the two groups and the lack of a complete renal scintigraphy examination protocol in the study population may raise doubts. Despite such limitations, we decided to publish our data to present the treatment results among a group of patients poorly described in the literature. An additional advantage of the study is the description of various methods of providing UOS, additionally using the SUS. Publishing these data could help expand the treatment of urinary tract strictures and design an appropriate prospective study. It is also worth exploring new trends in the treatment of urinary tract strictures, such as the use of anti-scar gels or drug-eluting balloons [10–13].

CONCLUSIONS

Based on the analysis of patients treated at our center for UOS, we believe that resection of the stenotic tissues and insertion of the SUS to heal the stenotic site is a more effective procedure than dilatation of the stenotic tissues without their removal. This approach results in fewer serious complications, ensures better QoL during stenting, and results in a higher chance of full therapeutic success. However, it should be noted that the study was conducted on a small number of patients and has numerous limitations. Therefore, to confirm the above data, a properly designed clinical trial, preferably a multicenter prospective randomized trial, should be conducted.

CONFLICT OF INTEREST

The main author, Filip Kowalski, has received honoraria for lectures and hands-on training from the Allium company. The other authors declare no conflict of interest.

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ETHICS APPROVAL STATEMENT

Approval of Ethics Committee: Collegium Medicum Ethics Committee in Bydgoszcz, Approval No. KB257/2024

References

1. Palou J, Salvador J, Millán F, Collado A, Algaba F, Vicente J. Management of superficial transitional cell carcinoma in the intramural ureter: what to do? J Urol. 2000; 163: 744-747.

2. Chou EC, Lin AT, Chen KK, Chang LS. Superficial transitional cell carcinoma of the ureteral orifice: higher risk of developing subsequent upper urinary tract tumors. Int J Urol. 2006; 13: 682-685.

3. Mano R, Shoshany O, Baniel J, Yossepowitch O. Resection of Ureteral Orifice During Transurethral Resection of Bladder Tumor: Functional and Oncologic Implications. J Urol. 2012; 188: 2129-2133.

4. Ishigooka M, Tomaru M, Hashimoto T, Sasagawa I, Nakada T, Mitobe K. Recurrence of urethral stricture after single internal urethrotomy. Int Urol Nephrol. 1995; 27: 101-106.

5. Wong HPN, So WZ, Fong KY, et al. Advances in urethral stricture diagnostics and urethral reconstruction beyond traditional imaging: a scoping review. Cent European J Urol. 2024; 77: 528-537.

6. Kahokehr AA, Granieri MA, Webster GD, Peterson AC. A Critical Analysis of Bulbar Urethroplasty Stricture Recurrence: Characteristics and Management. J Urol. 2018; 200: 1302-1307.

7. Gontero P, Birtle A, Compérat E, et al. Xylinas Patient Advocates: R. Wood Guidelines Associates: O. Capoun, B. Pradere, B.P. Rai, F. Soria, V. Soukup Guidelines Office: E.J. Smith, H. Ali EAU Guidelines on Non-muscle-invasive Bladder Cancer (TaT1 and CIS) 2024.

8. Cao M, Yang G, Pan J, et al. Repeated transurethral resection for non-muscle invasive bladder cancer. Int J Clin Exp Med. 2015; 8: 1416-1419.

9. Carilli M, Iacovelli V, Signoretti M, et al. Management of Ureteral Stricture Disease After Radiation Therapy for Pelvic Malignancies: A Retrospective, Multi-Institutional Analysis. Cancers (Basel). 2024; 16: 3561.

10. Perdzyński W, Adamek M. Calibration of urethra with anti-scar gel as a new preventive method for stricture recurrence after urethroplasty performed due to refractory anterior urethral stricture disease. Cent European J Urol. 2020; 73: 80-90.

11. Kallidonis P, Spiliopoulos S, Papadimatos P, et al. Long-term outcomes of paclitaxel-coated balloons for non-malignant ureteral strictures. World J Urol. 2022; 40: 1231-1238.

12. Li X, Zhao F, Xu L, et al. The safety and efficacy of paclitaxel-coated balloon for ureteric stenosis in a porcine model. BJU Int. 2024; 134: 564-567.

13. Durante J. Another step toward a better understanding of urinary drainage after upper tract endoscopy. Cent European J Urol. 2025; 78: 199.