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Original Article

Urethral overdilation for women with voiding dysfunction

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ABSTRACT

Objective: This was a retrospective study of the efficacy of urethral overdilation (UOD) for women with voiding dysfunction.
Materials and methods: Thirty-six patients diagnosed with voiding dysfunction were enrolled. The main indications for UOD included women with poor compliance (30 patients, 83.3%) and obstructive symptoms with high residual urine (6 patients, 16.7%). We utilized a method called UOD (wide caliber), dilating the urethra up to 54 Fr. Patients were re-evaluated every 3 months with serial free flow rate and ultrasound residual in the first year and then as scheduled. Outcome measure was based on the change in videourodynamic parameters, Urogenital Distress Inventory-6 (UDI-6) questionnaire, and International Prostate Symptom Score (IPSS).
Results: Mean follow up period of 33.2 months (range: 13–61 months). Failure or success depended on the change in videourodynamic parameters, UDI-6 score, and IPSS. The mean age with the Success Group ($n = 22$, 61.1%) and Failure Group ($n = 14$, 39.3%) was 52.8 years and 54.1 years, respectively. Our data showed significant improvements in mean UDI-6 score and IPSS after treatment (11.5–5.7, $p = 0.032$ and 14.8–5.2, $p = 0.006$, respectively). By analyzing multiple parameters (age, parity, body mass index, videourodynamics parameters, anesthesia bladder capacity, UDI-6 score, and IPSS) between the success and failure groups, we found only anesthesia bladder capacity reached statistical significance (536 mL vs. 418 mL, $p = 0.005$).
Conclusion: The present study provides evidence that UOD, as a minimally invasive procedure, achieves a satisfactory cure rate on short-term follow-up for women with voiding dysfunction.

Introduction

Urethral dilation is not a new surgical technique and has been used as an alternative treatment for voiding dysfunction for many years. Previous reports cited applications in treating neurogenic bladder [1], voiding dysfunction in women [2], and recurrent urinary tract infections in children or management of high-risk myelomeningocele [3,4]. However, among currently practicing gynecologists this technique remains controversial [5–8] for reasons ranging from change in indications to less-perceived effectiveness.

Also, controversies existed in this field from lack of long-term follow-up or well-controlled studies. Moreover, there is a lack of uniformity about the size to which one dilates the urethra.

Urologists have tended to use either local anesthesia or nothing when performing urethral dilation up to 26–36 Fr. Based on our previous study (data unpublished), urethral overdilation (UOD) improved voiding efficacy, bladder compliance, and even relieved storage symptoms. Therefore, we propose that effective dilation can only be done under general anesthesia if the purpose of dilation for women with voiding dysfunction is to alter the balance between detrusor power and bladder outlet resistance, and that perhaps dilating to 36 Fr is not sufficient. We described a method called UOD, which meant the urethra was dilated up to 54 Fr. The purpose of this study was to improve bladder emptying, bladder compliance and, to a less extent, relieve storage symptoms. We reported our experience using UOD for the management of women with voiding dysfunction.

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Materials and methods

Study design

This was a retrospective study of the efficacy of UOD in 36 women with voiding dysfunction. Between January 2005 and December 2010, women with poor compliance and obstructive symptoms registering high residual urine were enrolled in the study. Three of 36 (8.3%) women had previous urethral dilation diagnosed by other doctors. All the clinical data and video-urodynamic studies (VUSs) results were recorded in a prospective setting with the same protocol. The Institutional Review Board of Chang-Gung Memorial Hospital, Tao-Yuan, Taiwan approved the chart evaluation of this retrospective study.

The study protocol included the following. First, all patients underwent a face-to-face structured interview that included questions related to age, parity, medical illness, and previous surgery. Drug history was also obtained to exclude a cause that may aggravate the symptoms. Physical examination included height, weight, and pelvic examination to detect the presence of pelvic organ prolapse. Digital examination and pin prick test were performed to assess the S2–4 dermatome. Patients with abnormal neurological signs such as Babinski sign during pelvic examination or unsteady gait were assessed for their underlying diseases. All women in the study group had a baseline assessment including urinalysis, post-void residual checked by ultrasonic bladder scan (BVI 3000; Diagnostic Ultrasound Corporation, Bothell, WA, USA), and a bladder diary. For better understanding of their self-described response, women were asked to fill out the Urogenital Distress Inventory-6 (UDI-6) questionnaire and International Prostate Symptom Score (IPSS) before and after treatment.

Second, in all cases only one physician (L.H.T.) performed the VUS throughout the study period using the same protocol, which complied with the guidelines of the International Continence Society [9], and all of the terms used in this study followed the guidelines of the Society. A 4 F double lumen catheter (Medical Measurement Systems, Enschede, The Netherlands) was inserted into the bladder and a 10 F rectal catheter (Medtronic, Skovlunde, Denmark) was inserted into the rectum. VUSs were performed according to the standard protocol. Uroflowmetry and filling and voiding cystometry were performed with a Dantec Menuet (Dantec Medical A/S, Skovlunde, Denmark) multichannel urodynamic machine combined with a C-arm imaging system (GE OEC 7700). All data were recorded and analyzed using the Dantec Menuet multichannel urodynamic machine (Dantec Medical A/S).

Patients' characteristics are shown in Table 1. Poor compliance meant end-filling pressure > 20 cmH_2O [10]. The normal range for bladder compliance in adults has not been validated and previous reports suggested the normal range should be 12.5–40.0 mL/cmH_2O [11–13]. Instead of choosing volume/pressure change, we found that end-filling detrusor pressure was more practical for clinical use and easy to read. This study adopted an end-filling detrusor pressure > 20 cmH_2O to define poor bladder compliance; a cut-off commonly observed in clinical practice [10]. High residual urine was defined as > 100 mL [14]. UOD was performed only after medical treatment failure, i.e., the patients had received α-1-blockers and/or anticholinergics, or physiotherapy for a 3-month period, but failed to improve voiding efficacy or compliance. All patients had a baseline evaluation, including VUS and cystoscopy at the beginning of treatment and 6 months later, with the intention to gauge the vesicle pressure change and detect if urethra fibrosis existed.

The technique of UOD was as follows. After obtaining adequate general anesthesia, a 22 Fr panendoscope was placed in the bladder and the bladder and urethra were inspected with right-angle lenses. In each patient the bladder was distended to a capacity at 80 cm water pressure, the volume was measured, the bladder was reinspected and distended for a second time to 80 cm water pressure, and left for 5 minutes. On this occasion we intended to establish the capacity and mucosal change. Usually, we left the bladder partially full and then dilated the urethra with Hegar dilators progressively from Number 9 (27 Fr) to Number 18 (54 Fr) (Fig. 1). The decision of the final size of the Hegar dilator (No. 18, 54 Fr.) was based on the theory proposed by Turner-Warwick and Chapple [15], in which they aimed to restore natural voiding by reducing the urethral sphincter closing pressure by progressive stepwise recalibration. Our goal was to dilate and stretch the urethra to its distensible limits. At the completion of dilatation, we placed a 20 Fr catheter into the bladder and a pack in the distal vagina to tamponade the urethra. The procedure was performed on an inpatient basis, and all patients were taught clean intermittent catheterization preoperatively, and were instructed to perform self-catheterization if they had any urinary retention after the procedures.

The subjective outcomes evaluation and quality of life assessment including the use of UDI-6 questionnaire, and IPSS were performed before and after treatment. Patients were reevaluated every 3 months after UOD with free flow rate plus ultrasound

Table 1
Demographic and clinical characteristics between groups.

		Poor compliance, $n = 30$	Obstructive symptoms, $n = 6$
Age (y)		53.1 ± 7.3	57.5 ± 6.3
Parity		2.7 ± 1.2	3.7 ± 1.4
Body mass index		24.9 ± 3.5	26 ± 3.7
History of RH (%)		14 (46.7)	
Menopause		24/30 (60)	6 (100)
Etiology			
Neurogenic	DM	8	1
	Stroke	2	1
Surgical	RH	12	2
	Hysterectomy	2	
	Continence procedure	1	1
	Prolapse surgery	4	
Idiopathic		1	1
Residual urine (mL)		111 ± 20.5	132 ± 15.7
End-filling pressure (cmH_2O)		31.5 ± 9.4	7 ± 2.6
Max. cystometric capacity (mL)		351 ± 11.9	463 ± 14.7
Aesthesia bladder capacity (mL)		451 ± 34.7	625 ± 15.2
UDI-6 score		11.2 ± 3.5	12.3 ± 2.7
IPSS		14.2 ± 2.1	14.1 ± 3.1

Data are presented as n (%) or mean ± SD.
DM = diabetes mellitus; IPSS = International Prostate Symptom Score; RH = radical hysterectomy; UDI-6 = Urogenital Distress Inventory-6.

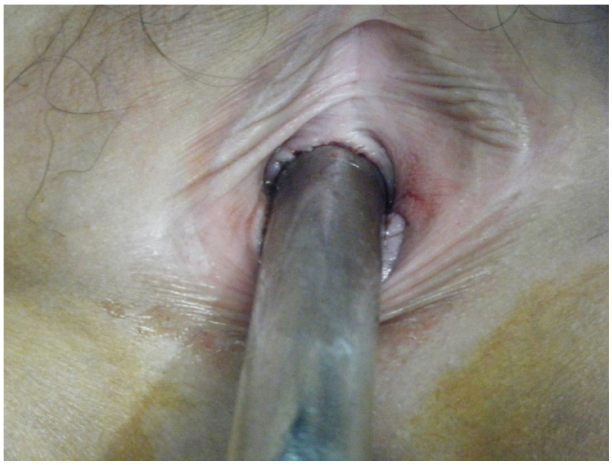

Fig. 1. Urethral overdilation using Hegar dilator. We dilated the urethra with Hegar dilators progressively from Number 9 (27 Fr) to Number 18 (54 Fr).