Practical urodynamics

Practical urodynamics in children, part 2: Normal uroflowmetry curve is not a guarantee of normal voiding function

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1. Introduction

Since uroflowmetry and postvoiding residual (PVR) urine tests are noninvasive and relatively inexpensive, they are regarded as first-line screening tools for evaluating pediatric voiding function.1 The International Children’s Continence Society states that bell-shaped uroflowmetry curves usually imply normal voiding function in children.2 Herein, we present a girl with voiding dysfunction who had a normal bell-shaped uroflowmetry curve because of abdominal straining.

2. Case report

A girl 14 year of age with a history of pelvic yolk-sac tumor status, postradical excision surgery, and adjuvant chemotherapy at 1 years of age was regularly followed-up at our clinic for symptoms of voiding difficulty. In a review of her history, regular image follow-up showed no recurrence of the yolk-sac tumor. Her chronic constipation was managed with diet fiber and laxatives. At the age of 5 years, an urodynamic study at another hospital revealed normal findings. At the age of 8 years, voiding cystourethrography disclosed left grade I vesicoureteral reflux with remarkable residual urine, and a neurogenic bladder was diagnosed. Clean intermittent catheterization was performed since that time. At the age of 9 years, she had several episodes of afebrile urinary tract infection (UTI) with Escherichia coli, although clean intermittent catheterization

Fig. 1. (A) Q-max of 20.5 ml/second, voided volume of 303.7 ml, and PVR of 41.2 ml (April 2009); (B) Qmax of 21.1 ml/second, voided volume of 320.9 ml, and PVR of 134 ml (April 2009); (C) Qmax of 19.9 ml/second, voiding volume of 283.8 ml, and PVR of 48.7 ml (September 2011). PVR, postvoiding residual.

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was performed three times per day, and prophylactic antibiotics with cephalexin were prescribed. She could empty most of the urine (with a voiding efficiency of 80%), and the catheterized PVRs were around 20–100 ml. A videourodynamic study (VUDS) disclosed fair bladder compliance, a delayed bladder neck opening time, and a high detrusor pressure with a low peak flow rate. Alpha adrenergic blockers, i.e., 1–2 mg terazosin or 0.2 mg tamsulosin per day, were prescribed. Voiding efficiency increased up to 90%, and the catheterized PVRs were usually <20 ml.

At the age of 12 years, she underwent two uroflowmetry tests that disclosed a nearly normal bell-shape and staccato pattern (Fig. 1A and B). PVRs were both >10% of the bladder capacity. A VUDS demonstrated intermittent sphincteric contractions under fluoroscopy (Fig. 2). Abdominal straining with low detrusor contractility was disclosed in the cystometric study (Fig. 3). However, the uroflowmetry curve at the age of 14 years disclosed a nearly normal bell-shape with an increased PVR (Fig. 1C). Due to long-term difficulty in voiding and defecation, she experienced vaginal vault prolapse in October 2011.

3. Discussion

Despite the fact that a bell-shaped uroflow curve is regarded as normal, it is not a guarantee of normal voiding function (Fig. 1A and C). Detailed history taking, physical examination, and a voiding diary along with PVR urine tests may be of great help in diagnosing children with lower urinary tract dysfunction and symptoms. A videourodynamic study should be done in children refractory to conservative treatment and suspected of having a neurogenic bladder or anatomic anomalies.1 As the good contractility of pediatric detrusor can overcome outlet resistance, the peak flow rate might not be a good parameter for monitoring voiding function. Girls with detrusor sphincter dysynergia can empty their bladder and overcome bladder-outlet resistance through abdominal straining. A repeatedly elevated PVR, i.e., >10% of the bladder capacity, can serve as a guide to abnormal voiding function. At large voided volumes, a staccato flow pattern was more significant, and the PVRs became significantly elevated (Fig. 1B).

Abdominal straining to empty the bladder or rectum should be discouraged in children with voiding dysfunction and chronic constipation. Pelvic organ prolapse became prominent when our patient used abdominal straining to facilitate defecation, urination, or both. The role of alpha-blockers in managing neurogenic voiding dysfunction is controversial.1–5 Voiding efficiency improved in this girl, and the fact that she took it regularly for more than 5 years supports the positive effects of alpha-blockers in improving voiding function in children. Regular clean intermittent catheterization and adequate fluid intake were the cornerstones to treating this case with fair bladder compliance and poor relaxation of the sphincter. Prophylactic antibiotics were not necessary in this case, and the renal function was stable for 5 years. Therefore, antibiotics were prescribed only when symptomatic UTI occurred.

Conflicts of interest statement

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

References


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Fig. 2. (A) Serial image study disclosing smooth passage of the contrast medium; (B) cessation of the passage of contrast medium; and (C) appearance of contrast medium.

Fig. 3. Videourodynamic study showing fair bladder compliance associated with significant abdominal straining, low detrusor contractions, and a staccato flow pattern with a low peak-flow rate. Postvoiding residual urine was 31 ml.