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EMRAH ŞENEL

HÜSEYİN TUĞRUL TİRYAKİ

FATİH AKBIYIK

HALİL FARUK ATAYURT

TÜBİTAK

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Do uroflowmetric findings change by treatment of urinary tract infection in girls with dysfunctional voiding?

Emrah ŞENEL, H. Tuğrul TİRYAKİ, Fatih AKBIYIK, Halil ATAYURT

Aim: The goal of the study was to evaluate the efficiency of repeated uroflowmetry study in girls who present with dysfunctional voiding with normal radiologic evaluation.

Materials and methods: Twenty five children (25 girls with a mean age of 8.9 years) with recurrent urinary tract infection (UTI) and dysfunctional voiding who have normal radiologic evaluation were prospectively evaluated by uroflowmetry tests. Uroflowmetry study was repeated after the UTI treatment in asymptomatic period.

Results: Mean urine volume was 254.31 ± 199.49 cc and the mean micturition time was 25.22 ± 15.43 s at the first uroflowmetry. Prolonged micturition time was noted in 8 (32%) patients. At the second uroflowmetry, mean urine volume was 370.77 ± 217.89 cc, and the mean micturition time was 29.63 ± 26.42 s. Prolonged micturition time was noted in 7 (28%) patients. Flow pattern curve was bell-shaped in 9 patients and abnormal in 16 patients (64%). In the second investigation a normal flow pattern curve was noted in 10 patients and an abnormal pattern in 15 patients.

Conclusion: There was no difference between pre- and post-treatment uroflowmetry pattern in patients with dysfunctional voiding. Uroflowmetry investigation is not a very proper way for follow-up.

Key words: Children, dysfunctional voiding, uroflowmetry

Disfonksiyonel işemeli kız çocuklarında idrar yolu enfeksiyonunun tedavisi uroflowmetre bulgularını değiştirir mi?

Amaç: Tekrarlayan idrar yolu enfeksiyonu ile başvuran, normal radyolojik değerlendirmeye sahip disfonksiyonal işemeleri saptanan kız çocuklarında tedavi öncesi ve sonrası tekrarlanan uroflowmetre ölçümlerinin etkinliğinin değerlendirilmesi.

Yöntem ve gereç: Tekrarlayan idrar yolu enfeksiyonu yakınması ile gelen radyolojik incelemeleri normal olan ortalama 8.9 yaşında, disfonksiyonal işeme yakınmalı 25 kız olguda üroflovmetre incelemeleri prospektif olarak değerlendirmeye alındı. İdrar yolu enfeksiyonu tedavisi sonrası üroflov incelemeleri olguların asemptomatik oldukları dönemde tekrarlandı.

Bulgular: İlk incelemede ortalama idrar volumü 254.31 ± 199.49 cc, ortalama işeme zamanı 25.22 ± 15.43 sn olarak belirlendi. Uzamış işeme zamanı 8 olguda (% 32) saptandı. İkinci üroflovmetre çalışmasında ortalama idrar volümü 370.77 ± 217.89 cc, ortalama işeme zamanı 29.63 ± 26.42 sn olarak belirlendi. Uzamış işeme zamanı yine 7 olguda (% 28) görüldü. İlk üroflovmetre değerlendirmesinde 9 olguda işeme eğrisi çan eğrisi şeklinde iken 16 olguda (% 64) anormal şekilde idi. İkinci üroflovmetre değerlendirmesinde de 10 olguda normal işeme çizelgesi görülürken 15 olguda anormal işeme paterni gözlendi.

Sonuç: Disfonksiyonel işemesi olan hastaların; tedavi öncesi ve sonrası üroflovmetri bulgularında değişiklik yoktu. Dolayısı ile bu hastaların takibinde üroflovmetri uygun bir yöntem değildir.

Anahtar sözcükler: Çocuklar, disfonksiyonel işeme, üroflovmetre

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Department of Pediatric Surgery, Dışkapı Childrens Hospital, Ankara, TURKEY

Correspondence: *Emrah ŞENEL, Department of Pediatric Surgery, Dışkapı Childrens Hospital, Ankara - TURKEY*
E-mail: dremrah2000@yahoo.com

Introduction

Urodynamic study is a basic investigation for evaluation of dysfunctional voiding (1-3). Uroflowmetry, as the only non-invasive urodynamic investigation, is widely used in children for the diagnosis and follow-up of dysfunctional voiding (1,4,5). Evaluating the symptoms of the dysfunctional voiding with non-invasive tools (urine analysis, questionnaires, uroflowmetry, and post-voiding residual urine assessment) will not only help us to plan a rational treatment but will also let us evaluate the response to the treatment objectively. Although proper urine flow at the uroflowmetry generally shows normal urethral and detrusor function, the low flow rate does not exactly explain the urethral obstruction or insufficiency of the detrusor. Briefly, uroflowmetry does not give a clear indication of a differential diagnosis (1,2,4). However, as a screening module for observation of the effects of the surgical and medical treatment and for standardization before invasive investigations, uroflowmetry is still frequently used (3,6,7).

There are limited data on the changes in uroflowmetric studies at the asymptomatic period after the treatment of urinary tract infection in a symptomatic patient. Also there are not sufficient data regarding the improvement of the uroflowmetric findings. The purpose of this study was to evaluate the efficiency of repeated uroflowmetric study. Uroflowmetric study was compared in pre- and post-treatment of recurrent urinary tract infection in girls who have a negative radiologic evaluation for dysfunctional voiding.

Materials and methods

We prospectively reviewed repeated uroflowmetry evaluations of 25 girls who were admitted between 2005 and 2008 with recurrent UTI with dysfunctional voiding who had normal radiologic findings. Boys were not included in the study for standardization of the uroflowmetry findings. A child of any age with febrile repeated urinary tract infection underwent to a radiological evaluation after an initial diagnosis of UTI. Dysfunctional voiding was evaluated by a careful patient history and questionnaire (8). Girls with dysfunctional voiding symptom score (DVSS) greater than 6 were diagnosed as having dysfunctional voiding and underwent investigation. Children with co-occurring vesicoureteric reflux (VUR) or anatomical abnormalities were not included in the study. The time and the amount of urine voided were recorded in a simple 48-h voiding diary. For uroflowmetry testing, a computer-assisted urodynamic unit (MMS, The Netherland) was used.

The first uroflowmetry was performed at the diagnosis. The second uroflowmetry investigation was made at the asymptomatic period following the treatment. Treatment was consisted of prophylactic antibiotic therapy and training for urotherapy. Over 100 mL volume voided was sufficient to produce an acceptable uroflow study. The flow curves were categorized as normal (bell shaped) or abnormal (staccato, intermittent, or plateau). Post- voiding residual urine was also detected by ultrasonography. Pre-treatment and post-treatment flow pattern, uroflowmetry findings, and residual urine were compared.

Results were evaluated using the Student's t test and Spearman correlation coefficient. Any P value < 0.05 was considered significant.

Results

The ages of the girls ranged from 5 years to 17 years (mean 8.9 years). Initial uroflowmetry was performed following the initial diagnosis and control uroflowmetry investigations were carried out at the asymptomatic period after treatment.

Among the assessed patients, 32% reported voiding more than 10 times a day. Residual urine (more than 20 mL) was noticed in 44% (n = 11) of the patients. Five patients (20%) showed a decreased maximum flow rate (below 15 mL/sec).Urine volume was between 101 cc to 848 cc (mean 254.31 ± 199.49 cc) and the micturition time was between 10 sec to 70 sec (mean 25.22 ± 15.43 sec) at the first uroflowmetry. Prolonged micturition time was noted in 8 (32%) patients (longer than 26 s). At the second uroflowmetry, urine volume was between 100 cc and 892 (mean 370.77 ± 217.89 cc), and the micturition time was between 13 sec to 97 sec (mean 25.52 ± 26.42 sec). Prolonged micturition time was noted in 7 (28%) patients. At the repeated voiding diary, 34% of the patients reported voiding more than 10 times a

day. Residual urine was noted in 16% (n = 4) of the patients. Three patients (12%) showed a decreased maximum flow rate. Flow pattern curve was bell shaped in 9 patients and abnormal (intermittent 9 patient, staccato 7 patients) in 16 patients (64%). In the second investigation normal flow pattern curve was noted in 10 patients and abnormal pattern in 15 patients (10 patients with intermittent, 5 patients with staccato). Of the 16 patients with abnormal uroflow curves in the first investigation, 13 patients had abnormal uroflowmetry curves in the second investigation. Evaluation criteria and comparison of the uroflowmetry results are summarized in Table 1.

Discussion

Urinary tract infection is frequently encountered in childhood (9). Prompt diagnosis and treatment of urinary tract infection in children may prevent subsequent renal parenchymal loss (10). The treatment for urinary tract infection can be effective but recurrence is frequently observed (11,12). Some children with recurrent UTIs suffer from dysfunctional voiding (1,2,4). Dysfunctional voiding is a major cause of urinary infection in children especially in girls which can be assessed with a careful patient history, questionnaire, urinary diary, and uroflowmetry data. In children with idiopathic dysfunction, cystometric investigations do not have a significant additional value compared to baseline diagnostics. Therefore noninvasive methods should be the first-line diagnostic tools. Cystometric examination should be included to rule out severe bladder dysfunction only in patients with unsuccessful initial treatment.

Uroflowmetry investigation is a noninvasive technique that can be used frequently for the diagnosis and follow-up of dysfunctional voiding (1,4,5). Measurement of urine flow provides objective evidence for voiding ability. However, uroflowmetry is dependent on voided volume and other parameters. There is a close relationship between uroflowmetric findings and toilet training, which shows difference between societies (3,13,14,15). On the other hand, hydration of the patients at the time of evaluation influences the findings of the uroflowmetry (5).

Also intermittent and staccato type uroflowmetry is noted on a rate of 10% to 20%-25% in children who have no complaints of urinary system (6,7). Therefore during the evaluation of a symptomatic child, one should keep in mind that 10%-25% of non-symptomatic children may have a voiding pattern other than expected normal bell shaped one.

When we compared the uroflowmetry pattern curves in our series, no difference between pre- and post-treatment was observed. There were significant differences in voiding volumes at pre- and post-treatment evaluation (t : -3.776; df : 21; P = 0.001). Also differences were noted between pre- and post-treatment residual urine volumes. The increase in urine volume and decrease in residual urine volume can be attributed to the treatment of voiding dysfunction and the improvement of urinary tract symptoms. There was no correlation between an abnormal uroflow pattern and post-voiding residual urine ($r = 0.175$ $P < 0.05$). Uroflowmetry pattern curve did not improve although symptoms had disappeared.

Table 1. Evaluation criteria and comparison of the uroflowmetry results.

Evaluation criteria	First uroflowmetry	Second uroflowmetry
Urine volume (ml)	254.31 ± 199.49	370.77 ± 217.89
Micturition time (s)	25.22 ± 15.43	25.52 ± 26.42
Prolonged micturition time (longer than 26 s)	32%	28%
Voiding (more than 10 times)	32%	32%
Residual urine (more than 20 mL)	20%	12%
Abnormal flow pattern	64%	60%
Decreased max. flow rate (below 15 mL/s)	20%	12%

Uroflowmetry does not seem to be the proper technique for follow-up for dysfunctional voiding since no difference was noted in uroflowmetry pattern after treatment.

In conclusion, we have noted no difference between pre- and post-treatment uroflowmetry findings except urine volume in patients with dysfunctional voiding. Uroflowmetric findings did not change by treatment of urinary tract infection in patients with dysfunctional voiding. Uroflowmetric investigations are not the proper way for follow-up. Abnormal uroflowmetry findings are noted after treatment even in asymptomatic patients. Our treatment protocols are just directed towards the symptoms. It seems that the real bladder problem persists.

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