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Extraordinary daytime only urinary frequency in childhood: Prevalence, diagnosis, and management

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Summary

Introduction

Since standardization of the ICCS terminology, only two small case series of children with extraordinary daytime only urinary frequency (EDOUF) have been published. The aims of the present study were i) to describe a large cohort of children affected by EDOUF, to evaluate its rate among the main micturition pediatric disturbances, and to determine if there is different EDOUF onset among seasons; ii) to investigate possible associations with urodynamic abnormalities by non-invasive techniques; iii) to evaluate whether postponing micturition exercise (PME) can objectively verify the anamnestic data hinting at the EDOUF diagnosis; and iv) to determine the effect of postponing micturition at home.

Material and methods

We reviewed the records of all patients with EDOUF, nocturnal enuresis, and/or overactive bladder firstly examined from March 2012 to February 2016. We evaluated post-void residual and bladder wall thickness by urinary ultrasound and uroflowmetry and recorded the season in which the EDOUF started. Through the PME, the EDOUF diagnosis was confirmed if patients were able to postpone micturition reaching at least 80% of the expected bladder capacity without showing urinary incontinence. At home, we recommended postponing micturition for a maximum of 3 h if EDOUF

affected the normal daily activities of both children and parents. We set a telephone interview for 3 months later.

Results

The clinical characteristics of the EDOUF population are shown in the Table. The EDOUF rate was 12.1%. The rate of EDOUF onset was significantly lower during the summer than in other seasons ($p = 0.02$) and the OR for onset of EDOUF in the summer – compared with the other seasons – was 0.37 (95% CI 0.18–0.74; $p = 0.005$). Eighty-five (80.2%) patients reported an intermittent trend of the EDOUF with variable periods of improvement and worsening. All the EDOUF patients had normal uroflowmetry, 1/106 had post-micturition bladder wall thickness >5 mm and one post-void residual. At the PME, 106 out of 106 (100%) patients with EDOUF were able to reach at least 80% of the EBC without showing urinary incontinence or urgency incontinence. After 3 months, in 98.1% of the patients the symptoms had disappeared or improved.

Discussion and conclusions

Childhood EDOUF is rather common and is generally associated with normal non-invasive urodynamic patterns. The PME allows verification of anamnestic data of EDOUF. The sole recommendation to postpone micturition for a maximum of 3 h or until the micturition postponement became stressful could be considered as a possible approach.

Table Clinical characteristics of the 106 patients with EDOUF.

Age at EDOUF diagnosis, yr	6.8 ± 2.3
Female sex, no. (%)	53 (50)
SBP, SDS	0.31 ± 0.7
DBP, SDS	0.17 ± 0.8
Age at continence, yr	2.3 ± 0.5
Nocturia, no. (%)	1 (0.9)
Constipation, no. (%)	19 (17.4)
Urgency, no. (%)	0 (0)
Incontinence, no. (%)	0 (0)
EBC $>80\%$ at PME, no. (%)	106 (100)
Post-micturition bladder wall thickness >5 mm, no. (%)	1 (0.9)
Presence of post-void residual, no. (%)	1 (0.9) ^a
Maximum flow, mL/s	19.34 ± 10.2
Normal uroflowmetry, no. (%)	106 (100)
Normal urinalysis, no. (%)	106 (100)
Previous UTIs, %	2 (1.9) ^b
Daily micturitions, no.	20.1 ± 7.2
Mean daily voided volumes (% of the EBC)	28.7 ± 9.2

Data are given as means ± SDS, unless stated otherwise. DBP, diastolic blood pressure; EBC, expected bladder capacity; EDOUF, extraordinary daytime only urinary frequency; PME, postponing micturition exercise; SBP, systolic blood pressure; SDS, standard deviation score; UTI, urinary tract infection.

^a Only one patient presented a post-void residual of 30 mL.

^b All the UTIs were not febrile.

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Introduction

A previously healthy child can unexpectedly modify his/her normal daily voiding pattern, increasing the voiding frequency during the whole day or part of it. This condition is defined by the Standardization Committee of the International Children's Continence Society (ICCS) as extraordinary daytime only urinary frequency (EDOUF) [1]. EDOUF applies uniquely to toilet-trained children. It is characterized by a frequent need (at least once per hour) to void bladder that is associated with small micturition volumes solely during the day. In children affected by EDOUF, urinary incontinence is rare and nocturia usually absent [2]. This disorder is of benign nature, but it is necessary to rule out comorbidities such as polydipsia, diabetes mellitus, and nephrogenic diabetes insipidus [1]. Urodynamic studies have not yet been carried out for this condition, and no data on the prevalence of EDOUF are available in literature.

The hallmark diagnostic tools of EDOUF are represented by history and physical examination [1]. Younger children, however, can have difficulties in reporting their urinary symptoms and it is not uncommon for them and their parents to disagree on aspects of pediatric symptoms [3]. Moreover, it has been documented, both in adulthood and in childhood, that information provided by proxy respondent is not equivalent to that reported by the patients [3]. All the more reason why it could be useful to perform a simple, non-invasive test that allows objective definition of EDOUF signs/symptoms reported by parents and their children.

Articles describing EDOUF before 2006 did not use a unique definition for EDOUF, which has been known under various terms [4–10]. Since standardization of the terminology for the lower urinary tract function in children and adolescents [1], only two EDOUF case series of 14 [2] and 26 [11] children have been published, in one of which the ICCS EDOUF definition is not used [11]. Postponing micturition was reported as effective in a single patient treated with this approach 14 years ago by Goraya [12]. To the best of our knowledge, however, no more evidence about this approach is available in the literature and, at the present time, is not recommended with this condition [2]. The aims of our retrospective study were: i) to describe a large cohort of children affected by EDOUF, diagnosed according to the ICCS terminology [1], to evaluate the rate of EDOUF among the main pediatric micturition disturbances seen in our setting, and to determine if there is a different EDOUF onset among seasons; ii) to investigate a possible association with urodynamic abnormalities by non-invasive techniques; iii) to evaluate if a postponing micturition exercise can objectively verify the anamnestic data hinting at the EDOUF diagnosis; and iv) to determine the effect of postponing micturition at home for a maximum of 3 h or until the micturition postponement became stressful, if the increased voiding frequency affected the normal daily activities of either children or parents.

Patients and methods

We retrospectively evaluated all the records of the toilet-trained patients consecutively attending our department

from March 2012 to February 2016 for their frequent necessity to void associated with small micturition volumes solely during the day, in the absence of urgency incontinence, incontinence, and nocturnal enuresis, with subsequent EDOUF diagnosis. The setting of the study is a university referral center, evaluating children with nephrological problems. The catchment area is the South of Italy. EDOUF was rigorously diagnosed according to the ICCS definition: "EDOUF applies to a toilet-trained child who has frequent need to void that is associated with small micturition volumes solely during the day. The daytime voiding frequency is at least once per hour with an average voided volume of <50% of expected bladder capacity (typically 10–15%). Incontinence is rare and nocturia is absent. Comorbidities, i.e. polydipsia, diabetes mellitus, nephrogenic diabetes insipidus, daytime polyuria, urinary tract infections or viral syndrome, should be excluded" [1]. On the basis of anamnestic data, we recorded the season in which EDOUF started for every patient. The minimum and maximum medium temperatures for winter, spring, summer, and autumn in our region are of about 4 °C, 10 °C, 16 °C, 8 °C and 13 °C, 20 °C, 32 °C, 19 °C, respectively. We also reviewed the records of children with nocturnal enuresis and/or overactive bladder (OAB) firstly examined during the same period in our department. The study was conducted according to the principles outlined in the Declaration of Helsinki [13] and approved by our research ethical committee. The parents gave their consent before any procedure.

All the patients underwent complete physical examination, urinary ultrasound, and urinalysis; they were also given a 24 h fluid intake and told to keep a bladder and bowel diary for 48 h. On the basis of bladder diary records and excluding the first morning bladder voiding, we calculated the mean daily voided volumes (expressed as % of expected bladder capacity) and the mean frequency. Weight, height, systolic blood pressure, and diastolic blood pressure were measured as previously described [14].

After the anamnestic and clinical EDOUF diagnosis [1], patients underwent a "postponing micturition exercise" (PME). This exercise consisted of inviting the patients to postpone the micturition, even when reporting an "immediate and compelling" need to void, until they reached at least 80% of the expected bladder capacity ($EBC = [age (yrs) + 1] \times 30 \text{ mL}$) or until they showed urinary incontinence. The pre-micturition bladder capacity was evaluated by bladder ultrasound every time the patients reported the need to void. On the basis of the PME, the EDOUF diagnosis was confirmed if the patients were able to postpone what they referred to as an "immediate and compelling" need to void, reaching at least 80% of the EBC without showing urinary incontinence.

At the end of PME, all the patients were submitted to uroflow study and then to bladder sonography to evaluate post-void residual and bladder wall thickness. Any stressful events or dietary triggers (such as oxalate-rich diet) possibly contributing to cause the EDOUF [11] were not routinely evaluated in our daily clinical practice, but parents of the patient did not report any major stressful factors.

After the first evaluation of the patients, if the increased voiding frequency affected the normal daily activities of

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