

Research Article

Voiding dysfunction in children with culture positive urinary tract infection

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ABSTRACT

Background: Urinary tract infections (UTI) are one of the most common reasons for referral to a hospital. Early identification and prompt treatment will prevent complications associated with UTI. Voiding dysfunction is one of the leading causes of UTI in children. This study aims to assess children affected with UTI using dysfunctional voiding symptom scores (DVSS) and find the relationship between voiding dysfunction and UTI.

Methods: This study was conducted in the Department of Paediatrics, Sri Ramachandra Medical College, Chennai, Southern India. All the children who presented with culture positive UTI between April 2008 and Jan 2011 was prospectively analyzed. USG abdomen and X-ray spine were performed to detect any occult spinal or genitourinary tract anomalies and only those with normal findings were included for the study. Presence of voiding dysfunction was evaluated with modified DVSS score.

Results: Study population consisted of 184 children (age group 6–18 years) with female preponderance (M:F = 1:1.9). The most common isolated organism was *E. Coli*. Voiding dysfunction was identified in 38% using DVSS score. Voiding dysfunction was higher in girls (47.9%) compared to boys. In those with first episode of UTI voiding dysfunction was found in 43% (56/130). Those with recurrent UTI voiding dysfunction were found in 25.9% (14/54).

Conclusions: Voiding dysfunction was significantly higher in girls compared to boys with UTI. Voiding dysfunction was high even among those with first episode of UTI. It is essential to identify and treat voiding dysfunction in children with UTI.

Keywords: Urinary tract infections, Voiding dysfunction

INTRODUCTION

Urinary tract infection (UTI) is a common problem during childhood and around 40% of these children have associated vesico ureteric reflux and renal scarring. Identification of an anatomical or physiological predisposition to urinary infection is an integral part of the comprehensive management of pediatric UTI. Voiding dysfunction is one of the leading causes of UTI in children.¹⁻⁵ Voiding dysfunction is defined as any disturbance in bladder filling or voiding after toilet training. It is seen in children without anatomical or neurological problems.^{6,7}

The etiology of voiding dysfunction is still unknown and its incidence varies from 20 to 50% among children. Frequency, urgency and urge incontinence are the main symptoms of voiding dysfunction.⁸ Farhat et al described a dysfunctional voiding symptom score (DVSS) and Babu has used it earlier in identification of voiding dysfunction in children.^{9,10} In this study, we have used DVSS in children with UTI to identify their association. Several authors have stressed the importance of identifying and treating voiding dysfunction to prevent recurrent UTI and promote resolution of associated vesico ureteric reflux (VUR).¹¹⁻¹⁶

METHODS

A score more than 8 for boys, score more than 5 for girls are suggestive of voiding dysfunction.

Table 1: Modified Farhat et al score for voiding dysfunction.

Over the last month	Never	Up to 2 episode	3-14 episode	15 times or more
I have wet underwear during day	0	1	2	3
When I wet myself my underwear is soaked	0	1	2	3
I miss having a bowel movement everyday	0	1	2	3
I hold on to my pee by pee dance	0	1	2	3
I only go to bathroom one or two times a day	0	0	0	2
When I want to pee I cannot wait	0	1	2	3
I have strain to pee	0	1	2	3
It hurts when I pee	0	1	2	3
Parents to answer. Has your child experienced something stressful	No (0)		Yes (3)	
I don't remind voiding everyday	0	1	2	3
Total				

Question 5 refers to the number of urination: <3 and >8 (2 points) and between 3-8 (0 points).

Question 9 following are recognized as stressful conditions: New baby, new school, school problems, home problems, special events.

This study was conducted in the Department of Paediatrics, Sri Ramachandra Medical College and Research Institute, Chennai, Southern India. All the children who presented with culture positive UTI between April 2008 and Jan 2011 was prospectively analyzed. The data obtained was statistically analyzed with chi square test. The sample size 184 was statistically determined with 40 percent association of voiding dysfunction with UTI in children. After obtaining informed consent, detailed clinical history was obtained and physical examination was performed to rule out any congenital anomalies. USG abdomen and X-ray spine were performed to exclude any occult spinal or genitourinary tract anomalies. Only those with normal findings were included for the study. Presence of voiding dysfunction was evaluated with modified DVSS (Table 1). The responses were obtained from children in cases, where they were old enough to understand the questions and from parents in the remaining children.

RESULTS

The study population consisted of 184 children with female preponderance (M:F = 1:1.9). The age distribution was as follows: 6-9 years (17.4%), 10-13 years (52.2%) and 14-18 years (30.4%). Voiding dysfunction was identified in 38% of the population with culture positive urinary tract infection. *E. Coli* was the commonest organism isolated in those with UTI.

In those with first episode of UTI voiding dysfunction was found in 43% (56/130). In children with recurrent UTI voiding dysfunction was found in 25.9% (14/54). This could be due to smaller number of patients in the study group with recurrent UTI (Table 2).

Table 2: Voiding dysfunction in those with first versus recurrent UTI.

	Voiding dysfunction	No dysfunction	Total
First culture positive	56 43.1%	74 56.9%	130 100.0%
Recurrent C/S positive	14 25.9%	40 74.1%	54 100.0%
Total	70 38.0%	114 62.0%	184 100.0%

Table 3 describes the associated symptoms in the children with voiding dysfunction. Voiding dysfunction was identified in significantly higher proportion of girls (48%; 58/121) compared to boys (19%; 12/63). Associated constipation was identified in 64% of those with voiding dysfunction with a majority in girls (3:2). Holding

maneuvers were identified in 42% of those with voiding dysfunction; with majority in girls (3:2). Associated stressful events are noted only in 16% of children with voiding dysfunction and UTI.

Table 3: Associated symptoms in children with UTI and voiding dysfunction.

Urgency	74%
Constipation	64%
Frequency	60%
Nocturia	58%
Nocturnal enuresis	50%
Holding maneuvers	42%
Straining	40%
Day time wetting	34%
Dysuria	32%
Decreased frequency	30%
Stressful events	16%

DISCUSSION

Up to 60% of children with UTI are said to have associated dysfunctional elimination syndrome, a term which covers voiding dysfunction and constipation. Multiple symptoms like frequency, urgency, urge incontinence, daytime wetting can be clues to underlying dysfunction.¹⁻⁹ Vincent's Curtsy (Figure 1) is a typical posturing in female children, who squat with heels on their perineum to manually overcome urgency. Eliciting a detailed history is essential to identify underlying voiding dysfunction in children with UTI.

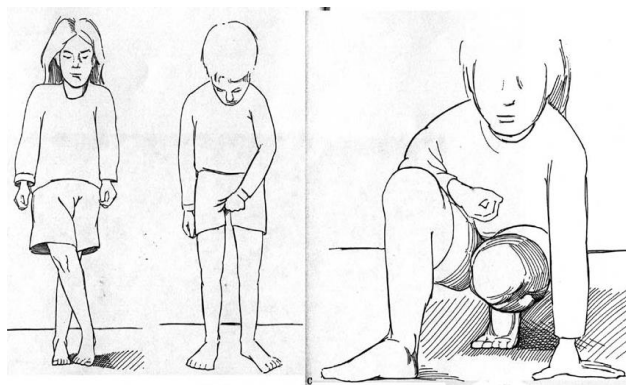


Figure 1: Vincent's curtsy: a typical posturing in children with voiding dysfunction to overcome urgency.

The prevalence of pediatric voiding dysfunction and daytime incontinence is difficult to determine due to varying definitions of urinary incontinence (UI) and different study designs. Furthermore, few studies have evaluated the prevalence of the different types of voiding dysfunction in children. The prevalence of daytime wetting varies with age and gender. Overall rates vary from 1% to 10%. In 6- to 7-year-old children, the rate is

between 2% to 4%, with a rapid decrease in subsequent years.⁶⁻¹¹ DVSS score is an established method to identify voiding dysfunction and we have used this tool effectively in the present study.^{9,10} In our study nocturia, nocturnal enuresis and daytime wetting were noted in a large proportion of children. All these findings highlight the effects of UTI and voiding dysfunction in bladder dynamics and how far it affects the quality of life of these children. According to our study, voiding dysfunction was as high as 38% ($p=0.001$) in children with UTI which is statistically significant (Table 2) and even common in those with first episode of UTI.

Associated VUR is high in those with UTI and voiding dysfunction and prompt resolution of VUR is unlikely when the underlying voiding dysfunction is untreated.¹¹⁻¹⁶ Careful history and physical evaluation can identify dysfunctional elimination syndrome and DVSS score is a useful tool in this regard. It is essential to address voiding dysfunction and dysfunctional elimination in all children with UTI with methods like biofeed back, laxatives and anticholinergics to prevent further attacks.

CONCLUSION

Voiding dysfunction was significantly higher in girls compared to boys with UTI. Voiding dysfunction was high even among those with first episode of UTI. It is essential to identify and treat voiding dysfunction in children with UTI.

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