

## Enuresis in Children: Urodynamic Assessment

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### Summary

**Evbuomwan I. Enuresis in Children: Urodynamic Assessment.** *Nigerian Journal of Paediatrics* 1987; 14:67. In order to determine whether or not there is a disorder of micturition dynamics in enuresis, urodynamic studies were carried out on 53 consecutive children, aged 5 to 15 years who presented with enuresis. Detrusor instability was the most frequent urodynamic abnormality found in the children. It was more common in primary than secondary enuresis. The degree of instability correlated with the frequency of associated daytime symptoms. It is concluded that urodynamic assessment is an important procedure in the investigation of enuresis and is helpful in the management of this condition.

### Introduction

ENURESIS is a term used to describe the condition in which a normal reflex act of micturition proceeds to involuntary voiding, at an age when urinary control is expected to be present, in the absence of any organic pathology<sup>1</sup>. The common presenting form which occurs at night is known as nocturnal enuresis and results in bedwetting. Enuresis is said to be primary when a child over 4 years of age has never been dry since birth. It is termed secondary or recurrent enuresis when after attaining normal dry nights at any age for a continuous period of twelve months, a child starts again to have bedwetting. Severity of enuresis varies from wetting once a month to 5 - 7 nights per week<sup>2</sup>.

Several explanations are given for the cause of enuresis and different drugs and treatment regimens have been tried with variable results<sup>3 4</sup>. In order to gain further insight into the disorder of micturition dynamics in enuretics, we assessed the functions of storage and voiding in children with primary and secondary enuresis.

### Materials and Methods

Fifty-three children (32 girls and 21 boys) aged 3 to 15 years seen consecutively for enuresis in the outpatient clinic of the Birmingham Children's Hospital between January and December 1981, were studied. Thirty-eight of them had been treated with various drugs including imipramine (80%), emepronium bromide, flaxovate hydrochloride, and phenylpropanolamine. Fifteen children were managed by other methods such as restriction of fluid intake at bedtime and use of alarm clock to wake up the child intermittently in order to

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urinate during the night. All the children were off drugs for at least, 2 months at the time of study.

Questionnaires and direct interview of parent and child were used to obtain a full history of micturition from birth through the period of potty-training to the time of presentation for each child. In order to assess the severity of the problem, questions were asked about the number of bedwetting nights per week, and the occurrence of daytime symptoms such as frequency of micturition, urgency and incontinence of urine. Micturition was considered frequent if voiding occurred at less than 2 hours intervals. A full clinical examination was carried out on each child before relevant laboratory tests such as blood, urine and radiological investigations to exclude organic diseases especially urinary tract infection, were done. These were followed by elaborate but non-invasive urodynamic studies.

Cystometry was done with the patient in supine position without anaesthetic or sedative. Two small-sized catheters were inserted into the bladder per urethram; one was used for continuous filling of the bladder and the other was connected via transducer to a four-channel amplifier attached to an oscilloscope for monitoring pressure changes in the bladder. Rectal pressures were simultaneously recorded with another catheter inserted into the rectum. The actual pressure due to bladder contractions were obtained by subtraction of rectal pressure from the total vesical pressures shown on the oscillograph.

By this method, two types of cystometrograms were obtained. The first was a normal pattern showing steady tracing of regular detrusor activity with intravesical maximum pressure usually not exceeding 6 cm of water (Fig 1). The other indicated instability characterised by spikes exceeding 10 cm of water (Fig 2).

## Results

Of the 53 children studied, 42 (79.2%) were primary enuretics and 11 (20.8%) were secondary enuretics. Four (40%) of the secondary enuretics had histories suggestive of emotional disturbances (moving homes, separation of parents, separation from parents, arrival of a new baby in the family). No such histories were obtained in the primary enuretics.

Flow rate was normal (20 - 30 ml/sec) in all the children. Urethral closure pressure profiles were normal in 50 children, but of the three girls with abnormal profiles, two had dilatation of the juxtavesical portion analogous to that which gives the radiological picture known as "spinning top" urethra. The third girl had ectopic ureteric opening into the urethra.

Cystometric patterns showed detrusor instability in 43 children, 39 (90.7%) primary enuretics and 4 (9.3%) secondary enuretics. Of these, ten had spikes of 10-20cm, eight 21-30cm, twelve 31 - 40cm, and thirteen over 40cm of water. Thirty-five children had associated daytime symptoms. Nineteen had frequency, 12 had frequency and urgency and 4 had both symptoms and in addition, urge incontinence. The distribution of daytime symptoms according to the cystometrogram pattern (Table) shows that frequency of daytime symptoms increased with increasing degree of severity of detrusor instability.

Out of 13 children with marked detrusor instability (spikes > 40 cm), ten were observed to experience early sensation for voiding during cystometry indicating small maximum functional bladder capacity. Uncontrollable leakage of urine around the catheters occurred in these children at the point of sensation of bladder fullness and 5 of them actually went into full voiding at first sensation of fullness.

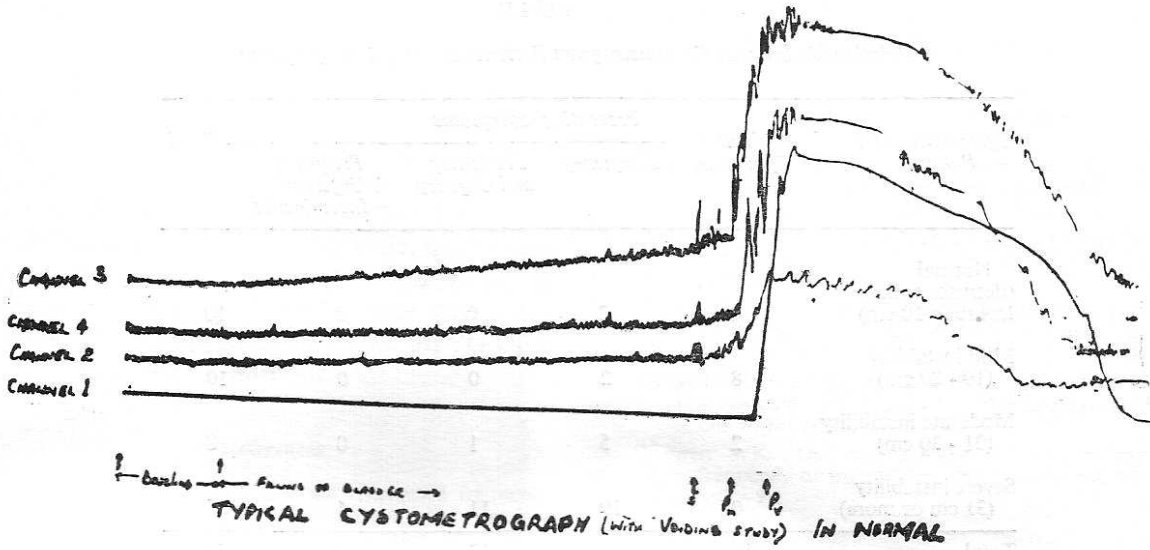


Fig 1. Normal cystometrograph, including voiding study

Channel 1: urinary flow rate.

Channel 2: Intrarectal pressures.

Channel 3: Total intravesical pressure.

Channel 4: Actual pressure due to bladder.

(Channel 3 minus channel 2)

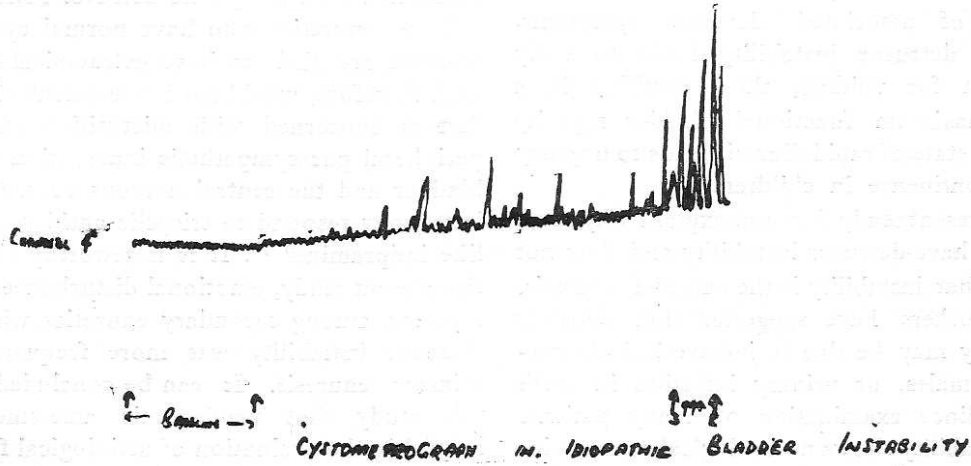


Fig 2. Cystometric pattern in idiopathic bladder instability. Spikes of detrusor activity reach above 10cm, and are marked towards the maximum bladder capacity.

TABLE

*Relationship between Cystometrogram Patterns and Daytime Symptoms*

Cystometrogram Pattern	Without Symptoms	Presenting Symptoms			Total
		Frequency	Frequency and Urgency	Frequency + Urgency + Incontinence	
Normal (detrusor spikes less than 10 cm)	8	2	0	0	10
Mild instability (10 - 20 cm)	8	2	0	0	10
Moderate instability (21 - 30 cm)	2	5	1	0	8
Severe instability (31 cm or more)	0	10	11	4	25
Total	18	19	12	4	53

### Discussion

This study shows that detrusor instability is the commonest urodynamic abnormality found in children with enuresis. It is more common in primary than in secondary enuresis. The degree of instability correlates with the frequency of associated daytime symptoms. Marked detrusor instability leads to early sensation for voiding, thus, resulting in a small maximum functional bladder capacity that in a state of rapid diuresis leads to urgency and incontinence in children.

The present study does not explain why some children have detrusor instability and does not suggest that instability is the cause of enuresis. Some workers have suggested that detrusor instability may be due to intravesical obstruction in males, or urinary infection in both sexes<sup>5</sup>. Since examination of many patients with instability shows no urological or neurological abnormality, such instability may be due to hyperactive reflex arc involving the bladder and spinal cord through the sacral plexus and

escaping the control of the higher centres in the nervous system<sup>6</sup>. This is considered to be immature development and usually corrects spontaneously at variable times and ages<sup>7 8</sup>. Hence, only expectant treatment is required in many cases of primary enuresis, as they are associated with idiopathic detrusor instability.

Thus, enuretics who have normal cystometrograms are likely to have extravesical causes and, therefore, would need assessment of other factors concerned with micturition such as peripheral parasympathetic innervation of the bladder and the central nervous control. The latter may respond to tricyclic antidepressants like imipramine<sup>9 10</sup>. It is noteworthy that in the present study, emotional disturbances were common among secondary enuretics whereas, detrusor instability was more frequent in primary enuresis. It can be concluded from this study that urodynamic assessment is helpful in the evaluation of aetiological factors in enuresis, and can be an important investigation in the management of enuresis.

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