REFRACTORY PRIMARY NOCTURNAL ENURESIS AND URODYNAMIC STUDIES, IS IT MANDATORY?

Diar H. Bajalan [a]

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ABSTRACT

Background

Enuresis is another meaning of intermittent nocturnal incontinence. It is a frequent symptom in children, with a prevalence of 5-10% at seven years of age, and is considered among the most prevalent conditions in childhood.

Objectives

To detect any Urodynamic study findings in patients presented with refractory primary nocturnal enuresis.

Patients and Methods

A prospective study was done for fifty patients who presented with pure Primary bedwetting (Monosymptomatic), {26 males and 24 females}, their age ranges from (5 to 24 years), who attended the Urodynamic section in the Urology Department, for the period: November 2010 till December 2014 after taking Medico-legal consent from all of them and performing a complete assessment for the patients.

Results

Regarding Urodynamic Study, nine patients (18%) had typical study, 24 patients (48%) had Detrusor Over-Activity, eight patients (16%) had Detrusor Under-Activity, two patients (4%) had DSD (Detrusor-Sphincter Dys-synergia), three patients (6%) had Detrusor Spasticity and one patient had Sphincteric deficiency. Regarding combined findings: one patient had Detrusor Under-Activity with DSD, one patient had Detrusor Over-Activity with Spasticity, and one patient had Detrusor Over-Activity with DSD.

Regarding the bladder capacity, seventeen patients (34%) had average bladder capacity, 28 patients (56%) had small bladder capacity and five patients (10%) had large bladder capacity.

Conclusion

According to our results, a significant percentage of the primary nocturnal enuretic patients had some Neuropathic Bladder. Does it recommend that every patient presented with Monosymptomatic Refractory Primary Nocturnal Enuresis do a Urodynamic study as their initial assessment? Besides, to find the exact type of abnormality and manage accordingly as soon as possible.

Keywords: *Primary Nocturnal Enuresis, Urodynamic study, Bladder capacity.*

[a] College of Medicine, University of Sulaimani, Kurdistan Region, Iraq.
Correspondence: diar.ali@univsul.edu.iq

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INTRODUCTION

Enuresis has the same meaning as intermittent nocturnal incontinence. It is considered a relatively benign condition and one of the top prevalent conditions in childhood, with a prevalence of 5-10% at seven years of age; and a spontaneous yearly cure rate of 15%. However, it is a stressful condition, putting a high psychological burden on children resulting in low self-esteem. The condition is described as 'Primary': when the symptom has existed always, and the patient has not been drying for a period longer than 6 months, and 'Secondary': when there has been a symptom-free interval of 6 months. Genetically, enuresis is a complex and heterogeneous disorder [(1)].

The regular bladder capacity is 400–500 mL. Bladder pressure throughout filling should remain low up to the point of voiding. The initial desire to void is usually sensed once the volume reaches 150–250 mL, but detrusor filling pressure should remain the same till there is a certain sense of fullness at 350–450 mL, the actual capacity of the bladder. If the functional volume of the bladder is under 100 mL, involuntary voiding can occur as often as every 15 minutes [(2)]. Despite extensive research, it remains a significant controversy relating to its aetiology. Overall, it is accepted that several pathological factors are possibly involved. A common finding is that the nocturnal urine output in many enuretic children is over the bladder reservoir capacity during sleep at night. Nocturnal polyuria can be either absolute, usually associated with a derangement of the circadian rhythm of antidiuretic hormone secretion, or relative, due mainly to a decreased functional bladder capacity during sleep at night[(3)].

However, there must be a simultaneous arousal failure in response to bladder fullness before bedwetting can occur. PNE is often associated with underlying bladder dysfunctions evident on urodynamics. In children with serious nocturnal enuresis, particularly those who were refractory to conservative treatment and failed to respond towards desmopressin therapy, there was a substantial reduction in functional bladder capacities compared with age-matched normal controls. Furthermore, it has been shown that other types of bladder dysfunctions, notably dysfunctional voiding, bladder instability, and marked detrusor hyper-contractility with extremely high voiding pressures suggestive of an obstructive pattern, are not uncommon among enuretic children. More recently, it has been shown on urodynamics that 73% of adults having primary nocturnal enuresis had some form of functional bladder outflow obstruction classified as primary bladder neck dysfunction, detrusor-sphincter Dys-synergia, and dysfunctional voiding (3). The rise in bladder capacity alongside the growth of the child is an essential step in the progress of bladder function and urinary continence for older children; the most widely accepted formula includes Koff's formula (Koff, 1983): Bladder capacity (mL) = [Age (year)+ 2] × 30 [(4)].

The lazy bladder syndrome is generally regarded as the endpoint of long-standing dysfunctional voiding culminating in a fully decompensated system. As a result of the chronic functional bladder outflow obstruction, there exists a progressive deterioration in detrusor contractility and emptying efficiency. Post-micturition residual urine and bladder capacity steadily increase, ultimately developing into a vast, floppy bladder with extreme inefficient emptying. The child uses abdominal straining as the main driving force for bladder emptying. Detrusor contractions are small and unsustained with extremely low pressures and are completely undetectable using conventional cystometry[(4)].

The diagnosis of PNE is made in the absence of any daytime symptoms or history of UTIs. The physical exam and urinalysis should be standard. A positive family history supports the diagnosis. Virtually all bedwetting will occur spontaneously before adulthood, and no treatment is necessary unless the problem is distressing to the child. Treatment options involve an enuresis (bedwetting) alarm and desmopressin [(4)].

Frequent bedwetting is defined as more than three wet nights per week and is associated with embarrassment and significant emotional and practical difficulties for affected children and their families [(6)]. Evidence has viewed that bedwetting is hereditary. Someone with two bedwetting parents has a 77% chance of becoming a bedwetter. When only one parent wet the bed the same as a child, his son or daughter was found to have a 40% chance of becoming a bed wetter. These probabilities carry within adulthood as well [(9)]. With an imbalance between night-time urine output and night-time bladder capacity, the bladder can effortlessly become full at night. Moreover, the child will either wake up to empty the bladder or will void during sleep. Measuring the daytime bladder capacity provides an estimate of bladder capacity to compare with typical values for age [(11)]. The monosymptomatic nocturnal enuresis (MNE) is recommended by the International

Children's Continence Society (ICCS) to distinguish MNE from non-monosymptomatic nocturnal enuresis (NMNE), which is accompanied by lower urinary tract symptoms (LUTS) for example, daytime urinary frequency, urgency, or urinary incontinence [13]. The presence of diurnal voiding symptoms was a strong predictor of bladder dysfunction [17].

Small bladder capacity refers to a circumstance where the urinary bladder cannot store the acceptable amount of urine in the bladder. Typically, the urinary bladder can hold a minimum of 300-500 mL of urine before a severe urge to urinate occurs. Men and women with smaller bladder capacity often feel that they must urinate whenever the bladder fills up, often lower than 100 mL of urine. They usually store a powerful urge to urinate to the point of not holding any longer when the bladder fills between 150-200 mL [18].

PATIENTS AND TECHNIQUES

All the (fifty) patients underwent full assessment, including a complete history and physical examination (especially neurological examination), urinalysis, urine culture and sensitivity, complete blood count, renal function test, blood glucose, Ultrasound exam for the abdomen and pelvis with measurement of PVRV (Post-Void residual volume), Diagnostic Cystoscopy (for some of them) and Urodynamic Study. The inclusion criteria were those patients with refractory primary nocturnal enuresis.

A prospective study of fifty patients from Sulaimani Teaching Hospital's Urology Department, who were chosen from the Urodynamic department (November 2010 to December 2014).

Twenty-six males (52%) and 24 females (48%), their age ranges from (5 to 24 years) (mean= 14.06 years), after taking Medico-legal consent from all of them.

Inclusion criteria

Those primary enuretic patients presented to the Urology clinic and failed to respond to medical treatment and or alarm for at least one year.

Exclusion criteria

Patients with combined diurnal and nocturnal enuresis, presence of any anatomical problem in the urinary tract, any neurologically diseased patients like Multiple Sclerosis or Cerebral palsy or patients having chronic illnesses like Diabetes Mellitus.

We classified the patients into:

1. Typical Urodynamic Study: Which means normal Uro-Flowmetry parameters (Peak flow rate above 15 ml/sec for males and above 25 ml/sec for females); during Cystometry and Pressure-Flow studies: (filling pressures starting from zero up to 15 cmH2O and Voiding pressures between 40-60 cmH2O, no involuntary detrusor contractions and no leakage of urine during the test, normal sensations, compliance and capacity of the bladder between 400-500 MLS) [10].

2. Detrusor Over-Activity (DOA): means: (presence of involuntary detrusor contractions in the course of filling cystometry above 20 cmH2O with or without leakage of urine, reduced cystometric capacity below three-fourths of maximum bladder capacity, hypersensitive bladder and reduced compliance of bladder) [10].

3. Detrusor Under-activity (DUA): means: (absence of involuntary detrusor contractions within filling cystometry without leakage of urine, increased cystometric capacity above 600 MLS, hypersensitive bladder and inability to start voiding or to maintain voiding during the test)[10].

4. Detrusor Sphincter Dys-synergia (DSD): means the presence of continuous contractions of EMG sticker electrodes during the voiding phase in Pressure flow study despite good detrusor contractions, i.e. (Absence of perineal muscle relaxation during voiding phase) [10].

5. Detrusor Spasticity (DS): Spasticity is the involuntary tightening or contracting of the muscles that are usual in folks with spinal cord injuries. (Around 65-78% of the SCI populations have a few amounts of spasticity; in addition, it is more regular in the cervical (neck) rather than thoracic (chest) and lumbar (lower back) injuries [16].

6. Intrinsic Sphincteric deficiency (SD), a combination of urethral anatomic and physiologic factors that do not achieve prevent stress urinary incontinence despite the presence or potential achievement of complete urethra-vesical junction support.

7. Functionally, the bladder neck and urethra under dynamic conditions of abdominal pressure do not maintain the pressure resistance required to prevent the escape of urine regardless of the absence of a bladder contraction.

Thereby, the three current causes that exhibit the result in a function definition are: first of all, lack of urethral mobility (less than 20 of urethral excursion with straining), secondly the presence of stress urinary incontinence, and lastly, the absence of a detrusor contraction at the time of stress leakage [16].

Simple statistical analysis used to calculate the results.

RESULTS

Regarding the Urodynamic Study, we found that (9) patients (18%) had typical UD study, 24 patients (48%) had Detrusor Over-Activity, eight patients (16%) had Detrusor Under-Activity, two patients (4%) had DSD (Detrusor-Sphincter Dys-synergia), three patients (6%) had Detrusor Spasticity and one patient had Sphincteric deficiency (SD). Regarding combined findings: one patient had Detrusor Under-Activity with DSD, one patient had Detrusor Over-Activity with Spasticity, and one patient had Detrusor Over-Activity with DSD.

Regarding the bladder capacity: 17 patients (34%) had standard bladder capacity, 28 patients (56%) had small bladder capacity and five patients (10%) had large bladder capacity.

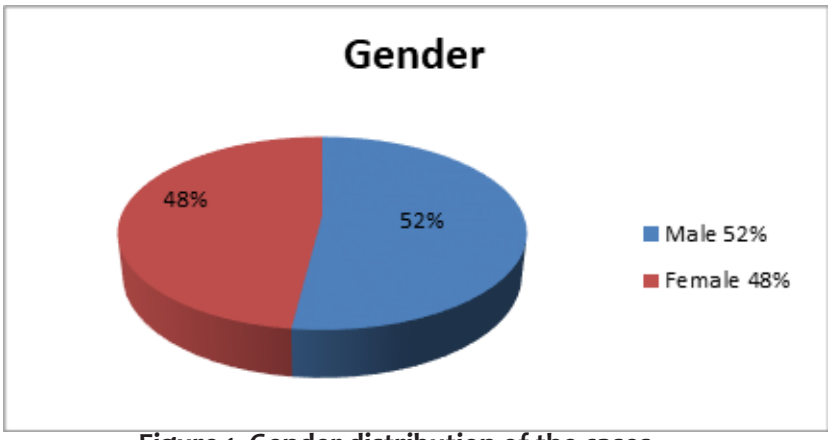

Figure 1. Gender distribution of the cases.

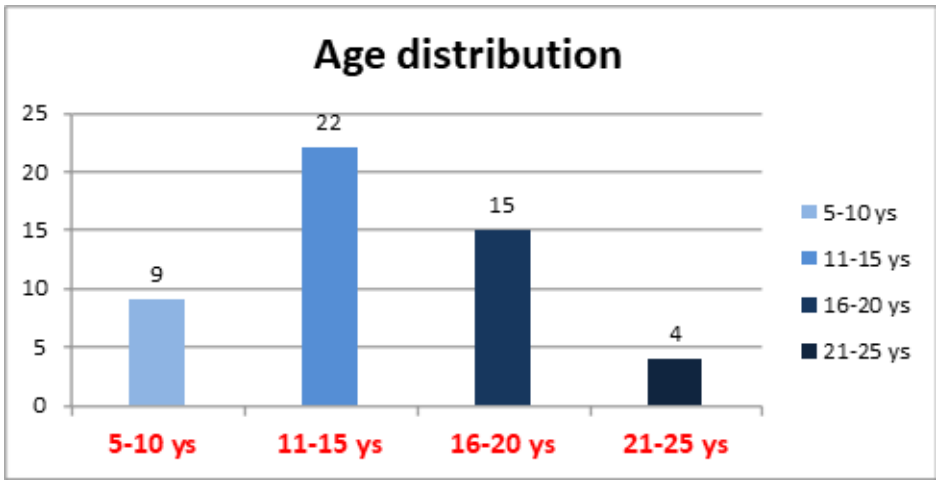

Figure 2. Age distribution of the cases.

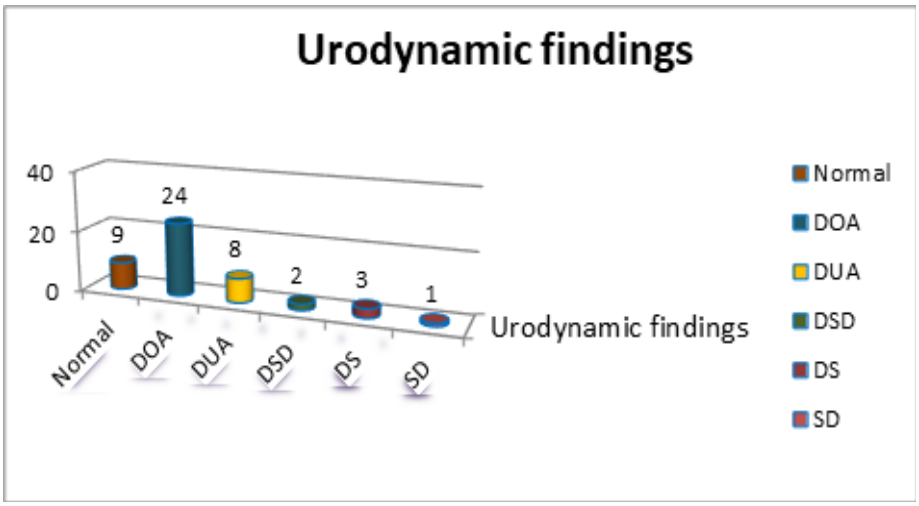

Figure 3. Urodynamic study result findings of the patients.

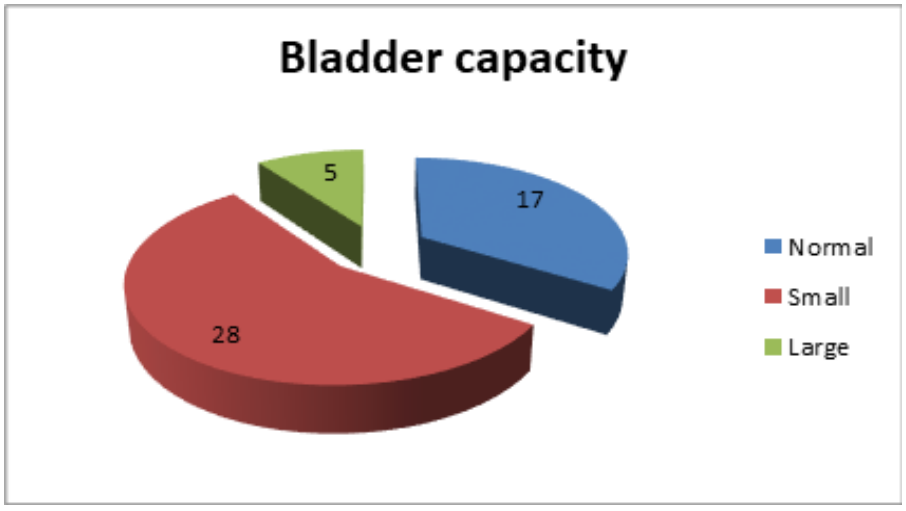

Figure 4. Functional Bladder capacity according to Urodynamic results of the cases.

DISCUSSION

From our results, a total of 41 patients (82%) had some sort and degree of neuropathic bladder dysfunction. Our results are slightly higher than the following study. To some degree, it is similar, it was published in 1999, addressed: (Bladder dysfunction in children with refractory monosymptomatic primary nocturnal enuresis), was done for 37 patients [7] by Yeung CK... et al. The department of surgery concluded the Primary Nocturnal Enuresis in adults besides being a psychologically disturbing condition, it is also a urological disorder alongside significant underlying bladder dysfunction that we should pay special attention to management. In this study published in the Journal of Urology, they concluded that: Abnormal bladder function, involving little functional capacity, instability throughout sleep and marked detrusor hypercontractility was usual in enuretic youngsters whose particular treatment failed [7].

According to the National Association of Continence, detrusor (bladder) over-activity has been found in up to 70-80% of primary nocturnal enuresis patients [9], while our results were only 48%. It might be explained on the basis that our sample might be smaller or there are racial differences.

A study was done and published in British Medical Journal [5]. They did Video-cysto-urethrography with simultaneous pressure and flow-rate recordings done on 50 patients referred for the investigation of persistent primary enuresis. Urodynamic studies showed nocturnal enuresis primarily associated with normal detrusor function and nocturnal plus diurnal enuresis mainly with abnormal detrusor function. Evidence is presented which suggests that these two distinct types of enuresis occurred de novo and do not overlap. out of 18 concerning formerly enuretic male patients, nine of them with abnormal detrusor function demonstrated persistent nocturnal along with diurnal symptoms[5].

In another study which Dong-Soo Ryu has done, et al. [12] concluded that the urodynamic findings were beneficial for directing children with PRMNE (Pharmacotherapy Resistant Monosymptomatic Nocturnal Enuresis) in the proper choice of other treatment strategies. Therefore, a routine UDS shall not be suggested prior to first-line associating treatment in children with NMNE (Non-Monosymptomatic Nocturnal Enuresis). They studied a total of 80 children (30 girls and 50 boys, the average age being between 8.4 ± 2.2 years), in which 19 of the youngsters were diagnosed with PRMNE and the rest of them, which were a total of 61 children, were diagnosed with NMNE were incorporated in the final analysis. All 61 children with NMNE displayed abnormal urodynamic outcomes of DO with or without decreased CBC (Cystometric Bladder Capacity) [12].

In a study done at Urology Department, Fayoum University Hospital, in which they included 30 patients in which they concluded that there is no statistically significant correlation between abnormal and normal filling cytometry [13]. In a study done in Rio De Janeiro in Brazil, they found that the observation of Bladder dysfunction was 94.5 % in teenagers and children with enuresis. They reached a Conclusion: The appearance of diurnal voiding symptoms was a powerful predictor of bladder dysfunction. The medical history was an effective instrument for uncovering diurnal voiding symptoms and settling the bladder dysfunction diagnosis [14] .

Regarding the bladder capacity, the study showed that 34% had standard bladder capacity, 56% had small bladder capacity, and 10% had large bladder capacity. From these data, we observe that more than half of the sample had a small cystometric capacity, i. e. less than 400 MLS. It means that over half of the patients with refractory PNE had small bladder capacities, which necessitate changing how we can manage those patients in the future.

CONCLUSION

According to our results, a significant percentage of the primary nocturnal enuretic patients had some Neuropathic Bladder. Therefore, does it recommend that every patient presented with Monosymptomatic Refractory Primary Nocturnal Enuresis do a Urodynamic study as their initial assessment? Besides, to find the exact type of abnormality and manage accordingly as soon as possible.

Further studies are recommended by taking a more significant number of patients in the future.

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