



## The assessment of constipation in monosymptomatic primary nocturnal enuresis

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**Abstract.** *Objectives:* Nocturnal enuresis and constipation are common pediatric problems. The aim of this study was to assess the incidence of constipation in children with or without monosymptomatic primary nocturnal enuresis. *Methods:* The study included 5350 children, ages 5–19 years, who were surveyed to detect the incidence of nocturnal enuresis. Of those surveyed, 679 (12.7%) had primary nocturnal enuresis. All children were questioned by mail with a standard form that addressed their micturition and defecation habits. The children those who had primary nocturnal enuresis were invited to the Pediatric Urology Section of the University Hospital. Of those 679 children, 125 kept that invitation. All 125 of those children underwent an abdominal ultrasound. Also, these children had serum creatinine levels drawn and plain abdominal films taken. *Results:* Constipation, defined as less than 3 bowel movements per week, was seen in 48 of 679 children with nocturnal enuresis (7.06%). Of those 4671 children without nocturnal enuresis, only 68 (1.45%) had constipation. The difference in constipation between the two groups was statistically significant ( $z = -9.251$ ;  $p = 0.000$ ). Of note, 10 of the 125 children (8%), evaluated at the hospital, had constipation. None of the children had an abnormal neurologic examination. Finally, faecal loading was detected on the plain films of 8 of the 125 children evaluated, 7 of who had constipation. The sensitivity of grading plain films for faecal loading to denote constipation in this population was 87.5%. *Conclusions:* Children with primary nocturnal enuresis should be thoroughly assessed for coexisting constipation.

**Key words:** Children, Constipation, Defecation, Primary nocturnal enuresis

### Introduction

Monosymptomatic primary nocturnal enuresis is a common pediatric problem. The incidence of primary nocturnal enuresis in children is 11.5% [1]. No definitive etiology has been determined for primary nocturnal enuresis, despite over 20 years of clinical research [2]. Developmental delay is one etiology of nocturnal enuresis. Anal sphincteric dysfunction is also seen in children with developmental delay [3]. The dysfunctional elimination syndrome, which includes bladder instability, the Hinman Syndrome, and constipation, has gained attention in recent articles discussing nocturnal enuresis [4].

Constipation is a common pediatric problem. It is underdiagnosed and treated poorly [5]. Children with encopresis and functional constipation have a significant incidence of such urinary disorders as enuresis,

infection, vesicoureteral reflux, and hydronephrosis [3, 6, 7]. Although the literature has reported on the association between constipation and the above mentioned urinary disorders since 1952, the routine evaluation of children with nocturnal enuresis lacks an assessment for constipation [8].

The objective of this study was to investigate the incidence of constipation, a symptom of anal sphincteric dysfunction, in children with or without monosymptomatic primary nocturnal enuresis.

### Material and methods

The study group included children from day care centers and schools, both primary and secondary. Both urban and rural schools were sampled to reflect the general population. This study was approved by the

ethics committee at the University of Mersin. During the interval from October of 1998 to August of 1999, 6500 children were questioned by mail about their micturition and defecation habits. Of these children, 5350 (82.3%) answered the questions fully and returned the standardized forms. Primary nocturnal enuresis was defined as bedwetting two or more times a week. This study included only children with monosymptomatic primary nocturnal enuresis. Secondary nocturnal enuresis was excluded from the study. The study population was divided into two groups: one group with monosymptomatic primary nocturnal enuresis (679 children) and one group without enuresis (4671 children).

Those children with primary nocturnal enuresis were invited to Pediatric Urology Section at the University of Mersin. Of those 679 children, 125 came to the hospital to undergo a thorough neurological examination and an abdominal sonogram. The neurologic examination, performed by a staff neurologist, consisted of a physical examination and, if necessary, an electroencephalogram (EEG). In addition, these children had serum creatinine levels drawn and plain abdominal films taken. A single radiologist from the university evaluated the plain films for faecal loading according to the method of Blethyn et al. [9]. All the children had normal serum creatinine levels and renal sonograms.

Constipation was defined as less than 3 bowel movements per week for a period of at least 6 months [4]. The study excluded children with neurological abnormalities, a history of colon surgery, bowel disease (such as Hirschprung's), developmental delay, or metabolic disease (such as hypothyroidism).

Statistical analyses were performed using the *z* hypothesis test and chi-square test to compare constipation rates and independent *t*-test to compare the mean ages and the duration of constipation in the two populations.

## Results

Of the 5350 children surveyed, ages 5–19 years, monosymptomatic primary nocturnal enuresis was detected in 679 (12.7%). Table 1 shows the mean age, constipation rates, and the duration of constipation in those with and without nocturnal enuresis. Of those 4671 without nocturnal enuresis, 2784 were boys (59.6%) and 1887 were girls (40.4%) and the mean age of these children was  $9.14 \pm 2.89$  years. Of those

Table 1. The mean age, constipation rates, and the duration of constipation in monosymptomatic primary nocturnal enuretic and non-enuretic groups

|                                     | Primary nocturnal enuretic group | Non-enuretic group        | <i>P</i> -value |
|-------------------------------------|----------------------------------|---------------------------|-----------------|
| # of children                       | 679                              | 4671                      |                 |
| Age (year)                          | $9.23 \pm 2.36$<br>(5–18)        | $9.14 \pm 2.89$<br>(5–19) | 0.43            |
| # of children with constipation (%) | 48 (7.06)                        | 68 (1.45)                 | 0.000           |
| Duration of constipation (year)     | $4.6 \pm 2.97$                   | $1.8 \pm 0.9$             | 0.14            |

679 with nocturnal enuresis, 405 were boys (59.6%) and 274 were girls (40.4%) and the mean age of these children was  $9.23 \pm 2.36$  years. The difference in mean ages between the 2 groups was not statistically significant ( $p = 0.43$ ). The mean number of bedwetting episodes per month in children with primary nocturnal enuresis was  $25.7 \pm 7.31$  days (10–30 days). The mean duration of constipation in children with and without nocturnal enuresis was  $4.6 \pm 2.97$  years and  $1.8 \pm 0.9$  years, respectively. The difference between the two groups was not statistically significant ( $p = 0.14$ ). Constipation was found in a significant number of children with primary nocturnal enuresis. Specifically, it was seen in 48 of 679 children (7.06%). Of those 4671 children without nocturnal enuresis, only 68 (1.45%) had constipation. The difference in constipation between the two groups was statistically significant ( $z = -9.251$ ;  $p = 0.000$ ). Of note, 10 of the 125 children (8%) that came to the hospital had constipation. None of the children had an abnormal neurologic examination, and faecal loading was seen on the plain films of 8 of the 125 children evaluated, 7 of who had constipation. The sensitivity of grading plain films for faecal loading to denote constipation in this population was 87.5%.

## Comment

Despite environmental and regional differences, the rate of constipation among children admitted to pediatric services is 3–5%; however, in most cases, the constipation resolves quickly [10]. It is known that the incidence of urologic disease is significantly higher in children with constipation and/or encopresis [11]. Loening-Baucke reported that of those children with

chronic constipation, 29% had diurnal enuresis, 34% had nocturnal enuresis and 11% had urinary tract infections (UTI's) [3]. Chronic constipation was treated successfully in 52% of these patients. Following successful treatment of their constipation, 89% in the diurnal enuresis group and 63% in the nocturnal enuresis group showed a complete resolution of their enuresis. In addition, upon the successful treatment of constipation, none of those with UTI's had recurrent infections. In our study, the incidence of constipation was 7.06% among children with monosymptomatic primary nocturnal enuresis and 1.45% without nocturnal enuresis. The difference between the two groups reached statistical significance.

Because of the close anatomical relationship between the bladder, urethra and rectum, and their shared innervation from S<sub>2</sub>–S<sub>4</sub> nerves, often all are affected by common disorders, such as developmental delay. In their study, Dohil et al. found hydronephrosis in 5.8% of children without constipation and in 38% of children with constipation, before treatment [5]. The hydronephrosis declined to 14% following treatment of the constipation. O'Regan and Yazbeck showed that there was an inappropriate detrusor muscle contraction in those children with constipation [12]. In addition, they reported a higher incidence of UTI's and vesicoureteral reflux (VUR) in those children with dysfunctional voiding and constipation [6, 7]. In our study, none of the 10 children with both constipation and monosymptomatic primary nocturnal enuresis had hydronephrosis.

O'Regan et al. studied the relationship between constipation and VUR [7]. Of those 17 patients with VUR who had abnormal rectal monometry also had functional constipation. In another study, O'Regan et al. studied the relationship between constipation and UTI's [6]. In those 47 patients with both UTI's and constipation, the successful treatment of the constipation prevented the recurrence of UTI's in 93% and resolved enuresis in 68%.

Constipation is not routinely assessed in children with UTI's [13, 14]; however, in 1998, Koff and associates defined dysfunctional elimination syndrome [4]. They reported that constipation is a poor prognostic factor in the successful resolution of low-grade VUR. Also, constipation impacted unfavorably in those with dysfunctional voiding. In their studies, they detected the dysfunctional elimination syndrome in 82% of cases with VUR and in 77% of those with recurrent UTI's. Following antireflux surgery, UTI's persisted in 78% of those children with the dysfunctional elimi-

nation syndrome. This syndrome was present in those with persistent VUR postoperatively. As a result of this study, Koff and associates stressed the importance of detecting the dysfunctional elimination syndrome preoperatively in children with VUR.

The prolonged and frequent anal contractions seen in children with constipation might result in involuntary bladder contractions, thus leading to incontinence [6, 7, 15]. Bailey et al. reported abnormal anal electromyography in 57% of children with recurrent UTI's [15]. In contrast, O'Regan et al. reported functional constipation in all 17 children with VUR and abnormal rectal manometry [7].

## Conclusion

Although many papers discuss the coexistence of constipation and UTI's, none have examined the incidence of constipation in children with primary nocturnal enuresis. In our study, 1.45% of children without enuresis had constipation. In contrast, 7.06% of children with primary nocturnal enuresis had constipation. This difference was statistically significant ( $p = 0.000$ ). Therefore, we recommend assessing for constipation in children with primary nocturnal enuresis. However, our study did not include the results of constipation treatment due to limited number of children with constipation and primary nocturnal enuresis.

## References

1. Serel TA, Akhan G, Koyuncuoglu HR et al. Epidemiology of enuresis in Turkish children. *Scand J Urol Nephrol* 1997; 31: 537–539.
2. Lackgren G, Hjalmas K, von Gool J et al. Nocturnal enuresis: a suggestion for a European treatment strategy. *Acta Paediatr* 1999; 88: 679–690.
3. Loening-Baucke V. Urinary incontinence and urinary tract infection and their resolution with treatment of chronic constipation of childhood. *Pediatrics* 1997; 100: 228–232.
4. Koff SA, Theodore TW, and Jayanthi VR. The relationship among dysfunctional elimination syndromes, primary vesicoureteral reflux and urinary tract infections in children. *J Urol* 1998; 160: 1019–1022.
5. Dohil R, Roberts E, Jones KV et al. Constipation and reversible urinary tract abnormalities. *Arch Dis Child* 1994; 70: 56–57.
6. O'Regan S, Yazbeck S, Schick E. Constipation, bladder instability, urinary tract infection syndrome. *Clin Nephrol* 1985; 23: 152–154.
7. O'Regan S, Schick E, Hamburger B et al. Constipation associated with vesicoureteral reflux. *Urology* 1986; 28: 394–396.
8. Swenson O. A new concept in the pathology of megaloureters. *Surgery* 1952; 32: 367.

9. Blethyn AJ, Jones KV, Newcombe R et al. Radiological assessment of constipation. *Arch Dis Child* 1995; 73: 532–533.
10. McClung HJ, Boyne LJ, and Linsheid T. Is combination therapy for encopresis nutritionally safe? *Pediatrics* 1993; 91: 591–594.
11. Rushton HG. Wetting and functional voiding disorders. *Urol Clin North Am* 1995; 22: 75–93.
12. O'Regan S, Yazbeck S. Constipation: A cause of enuresis, urinary tract infection and vesico-ureteric reflux in children. *Med Hypotheses* 1985; 17: 409–413.
13. Weiss R, Tamminen-Mobius T, Koskimies O et al. Characteristics at entry of children with severe primary vesicoureteral reflux recruited for a multicenter, international therapeutic trial comparing medical and surgical management. The international reflux study in children. *J Urol* 1992; 148: 1644–1649.
14. Greenfield SP, Ng M, Wan J. Experience with vesicoureteral reflux in children: clinical characteristics. *J Urol* 1997; 574–577.
15. Bailey JA, Powers JJ, Waylonic GW. A clinical evaluation of electromyography of the anal sphincter. *Arch Phys Med Rehabil* 1970; 403–408.

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