Journal of Pediatric Urology (2022) 18, 446.e1–446.e7

Fecal disimpaction in children with enuresis and constipation does not make them dry at night

Malin Borgström [a,b,*,1], Amadeus Bergsten [a,2], Maria Tunebjer [a,3], Barbro Hedin Skogman [b,c,4], Tryggve Nevéus [a,5]

[a]Department of Women's and Children's Health, Uppsala University, Sweden

[b]Center for Clinical Research Dalarna, Falun, Sweden

[c]Örebro University, Örebro, Sweden

* Correspondence to: Malin Borgström, Department of Women's and Children's Health, Uppsala University, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden. Tel.: +46(0)70-3343239
malin.borgstrom@kbh.uu.se (M. Borgström)
Amadeus.bergsten@gmail.com (A. Bergsten)
Maria.tunebjer@region-uppsala.se (M. Tunebjer)
Barbro.hedinskogman@regiondalarna.se (B.H. Skogman)
Tryggve.neveus@kbh.uu.se (T. Nevéus)

Keywords
Nocturnal enuresis; Fecal disimpaction; Constipation; Treatment; Children

Abbreviations
DO, detrusor overactivity; LUT, lower urinary tract; PEG, poly ethylene glycol

Received 12 January 2022
Revised 9 May 2022
Accepted 11 May 2022
Available online 19 May 2022

Summary

Background
Constipation, daytime incontinence and nocturnal enuresis often overlap. Treatment of constipation has been shown to be an important aspect of therapy for children with daytime incontinence. However, the value of fecal disimpaction, as a part of constipation therapy, in children with enuresis has not been evaluated.

Aim
Our aim was to evaluate the antienuretic effect of fecal disimpaction in children with enuresis and concomitant constipation.

Methods
The bladder and bowel function was assessed non-invasively in children aged six to ten years who sought help for enuresis for the first time. If they were constipated according to the Rome IV criteria or had a rectal diameter exceeding 30 mm, as assessed by ultrasound, they were given standard evacuation with mini-enemas and macrogol therapy for at least two weeks. Enuresis frequency was documented 14 nights preceding and following therapy.

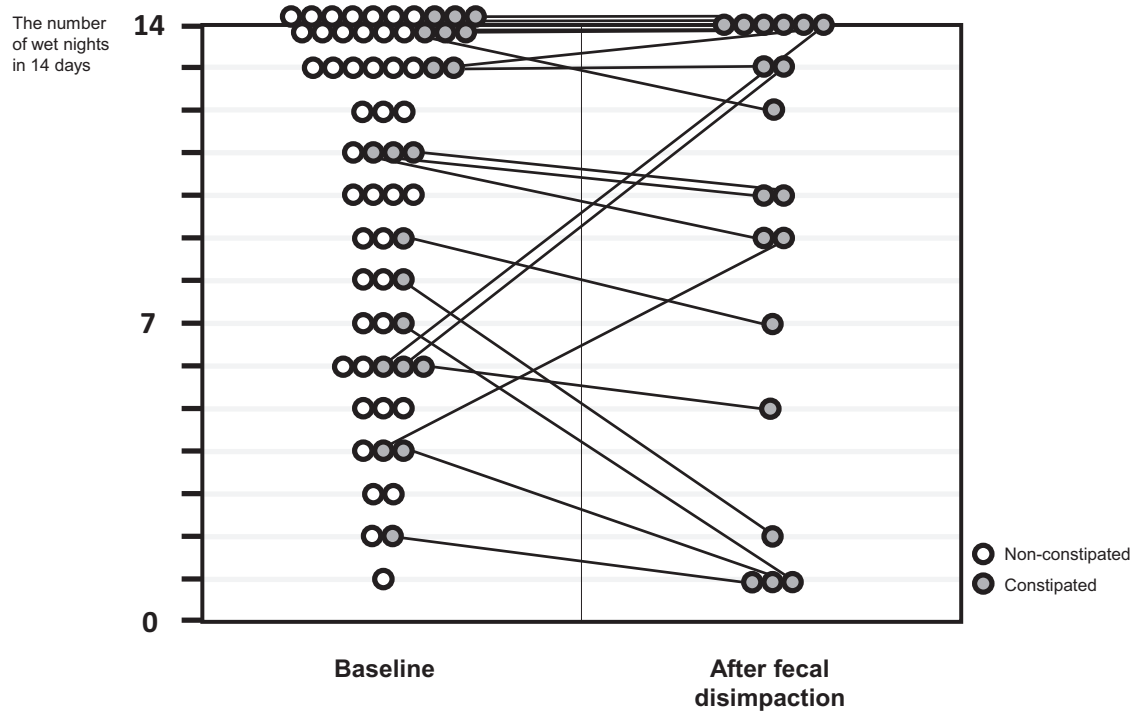
Results
In total, 66 children (20 girls, 46 boys) were evaluated, 23 (35%) of whom were constipated. There were no differences in age, sex or baseline bladder function between the two groups. The enuresis frequency per two weeks was 9.8 ± 4.1 nights before and 9.3 ± 5.1 nights after constipation therapy ($p = 0.43$).

Discussion
This study found that fecal disimpaction in children with enuresis who are also constipated did not alleviate nocturnal enuresis. Bowel problems may still need to be addressed but the child should not be given the false hope that this approach alone will make them dry at night. It might be that evidenced based therapies, such as the enuresis alarm and desmopressin, could be less efficient in children with enuresis and constipation unless their bowel disturbance is first properly addressed.

Conclusions
Fecal disimpaction in children with enuresis and concomitant constipation will, by itself, not make the children dry at night.

[1] Uppsala University, Department of Women's and Children's Health, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden and Center for Clinical Research Dalarna, Nissers väg 3, SE-791 82 Falun, Sweden. [2] Uppsala University, Department of Women's and Children's Health, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden. [3] Uppsala University, Department of Women's and Children's Health, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden. [4] Center for Clinical Research Dalarna - Uppsala University, Nissers väg 3, SE-791 82 Falun, Sweden, and Örebro University, Fakultetsgatan 1, SE-70281 Örebro, Sweden. [5] Uppsala University, Department of Women's and Children's Health, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden.

https://doi.org/10.1016/j.jpurol.2022.05.008



Summary Figure The number of wet nights in 14 days at baseline, in children with enuresis and no constipation (white) and the number of wet nights in 14 days at baseline compared to wet nights in 14 days, after fecal disimpaction in children with enuresis and constipation (grey).

Introduction

Nocturnal enuresis is both common and socially distressing. Approximately one in ten children in early school age suffer from this condition [1] and the social consequences for those afflicted are not trivial [2]. Since the 80s it has become clear that many children with enuresis have excessive urine production at night, i.e. nocturnal polyuria [3]. These children wet their beds because their bladder is filled to capacity before the night is over. It is also recognized that most children with enuresis are difficult to arouse from sleep and will not wake up when the bladder is full or contracts [4]. Furthermore, detrusor overactivity (DO) is established as a third crucial pathogenetic mechanism, based on both direct [5] and indirect evidence [1,6]. The consequence of DO is that these children wet their beds regardless of whether their bladder is full or not.

The current treatment situation for the children with enuresis is not satisfactory. There are three recommended first-line therapies — basic bladder advice, desmopressin and the enuresis alarm [7]. Among these, bladder advice has not been shown to be effective [8] and desmopressin is not curative and leads to reliably dry nights in only a minority of the children [9]. The enuresis alarm is well-established and has a clearly curative effect for more than half the children who use it — i.e. the children who become dry during alarm therapy will usually stay dry afterwards as well [9]. Still, many children with enuresis, perhaps 25%, are resistant to all therapies. For these children, who have experienced only failures, the associated psychosocial burden can be assumed to be extra high.

Functional constipation is another common disorder in children; the prevalence varies between 1 and 30% depending on the criteria used [10]. The Rome III criteria have been established as the gold standard definition for diagnosing constipation in children [11]. These criteria have been refined into the current version, Rome IV [12] and are intended to be useful in research as well as in clinical care. Accordingly, two or more of the following signs or symptoms occurring at least once per week for a minimum of one month must be included to fulfil the diagnosis of constipation:

- Two or fewer defecations in the toilet per week.
- At least one episode of fecal incontinence per week.
- A history of retentive posturing or excessive volitional stool retention.
- Presence of a large fecal mass in the rectum.
- A history of the passing of large stools that may obstruct the toilet.

Constipation treatment is based on first fecal disimpaction, i.e. evacuation of hard stools, and then maintenance of soft bowel movements. There is a recognized link between constipation and DO [13]. The reason for this connection may be partly anatomical; children with constipation use the rectum as a storage space, and the chronically distended rectum will compress the bladder from behind [14,15]. Another reason is that the two organs are controlled by overlapping areas of the central nervous system [16]. Finally, both enuresis and constipation, with or without fecal incontinence, are overrepresented among

children with neuropsychiatric disorders such as attention-deficit hyperactivity disorder, ADHD [17,18]. It is well established that children with daytime incontinence usually suffer from underlying DO [19] and that many of them also are constipated [20]. Treatment of daytime incontinence in these children will usually only be successful if the constipation is also recognized and treated [21,22]. The link between constipation and enuresis, as opposed to daytime incontinence, is less firmly established [1,23,24], but it can still be assumed that the two conditions overlap more often than would be explained by chance alone.

Children with enuresis can be supposed to benefit from recognition and treatment of concomitant constipation, starting with fecal disimpaction. This is also the reason why constipation therapy is included in international enuresis management guidelines [7]. However, this hypothesis has never been scientifically tested, which is unsatisfactory, given that labor-intensive therapies should not be generally recommended to non-hardcore patients without evidence for their effect. Our aim was to scientifically test the hypothesis that recognition and treatment of constipation, in otherwise unselected children with enuresis and concomitant constipation, will make the children dry at night already at the fecal disimpaction stage. A secondary aim was to look for differences in history or bladder data between children with enuresis with or without concomitant constipation.

Subjects and methods

Subjects

All children aged 6—11 years who were referred by their general practitioner or the school nurse to the pediatric outpatient ward due to enuresis were invited to participate in the study. Exclusion criteria were:

- Present daytime incontinence.
- Previous urotherapy.
- Previous treatment with the enuresis alarm or second-line antienuretic therapy.
- Voiding dysfunction or suspected lower urinary tract (LUT) malformation.
- Concomitant disorders influencing renal or LUT function.
- Inability to give informed consent or comply with instructions given.

We should underline that the enuresis of the included children needed not be strictly monosymtomatic, since urgency symptoms or increased/decreased voiding frequency were not exclusion criteria. This is in line with the current ICCS guidelines [7].

Baseline evaluation

At the initial visit to the study urotherapist (MB) a detailed history was taken, focusing on bladder and bowel habits. All children underwent noninvasive urodynamic evaluation (i.e. uroflow and ultrasonographic residual urine assessment) and had their horizontal rectal diameter measured via ultrasound. Before this examination the child was asked whether they sensed any urge to pass stool or if they had defecated within the last 4 h. If either of that was the case, the ultrasound was rescheduled.

The urotherapist (MB) then supplied the family with a voiding chart and bladder and bowel diary to be completed at home. The following data were gathered:

- Nights with enuresis during two weeks
- Voided volumes at each voiding during two days
- Nocturnal urine production, by weighing of diapers or sheet covers, during three nights
- Bowel movements during two weeks

The intervention

In this prospective study, a diagnosis of constipation was made in children who either fulfilled the Rome IV criteria [12] or who had a rectal diameter in excess of 30 mm. The condition was demystified and explained to the child and guardians, focusing of the distended rectum that compresses the bladder from behind [14,15]. Laxative treatment was prescribed with first mini-enemas and then PEG, according to international guidelines, as described above [22]. Thus, the child was prescribed mini-enemas daily for three days followed by every other day during one week. After the initial evacuation, the child was instructed to empty their bowel every day or at least every second day. If the child did not have bowel movements for two days, additional mini-enemas would be given, making sure the bladder was not disturbed by a distended rectum. The families were then, again, after two weeks instructed to complete a bladder and bowel diary and a voiding chart, while continuing laxative therapy. Adherence to treatment was encouraged and evaluated by repeated telephone contacts.

Constipation treatment was further continued for eight weeks during a randomized controlled study comparing urotherapy, the enuresis alarm and no antienuretic treatment which has been published separately [25].

Statistics

In the children with constipation, the number of wet nights per two weeks was compared between baseline and after laxative therapy, using paired t-tests or Wilcoxon signed rank tests. The children were also classified into groups according to treatment response according to the International Children's Continence Society classification (i.e. full response = complete dryness, partial response = at least 50% reduction of wet nights, and nonresponse = less than 50% reduction of wet nights) [26]. Possible predictive factors indicating antienuretic effect of fecal disimpaction were looked for among all data gathered at baseline using t-tests, Mann—Whitney tests or Chi^2 tests depending on the type and distribution of the variables. In a similar fashion, baseline data were compared between the children with and without constipation.

The sample size was determined with the aim of not missing a true difference in enuretic nights per two weeks pre- and post-disimpaction, of three or more wet nights (a smaller reduction would not be clinically relevant). This meant that at least 15 children adhering to constipation

therapy were needed. The power calculations arriving at this number are based on the enuresis frequency of comparable populations used in our previous research [8,27].

Ethics

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Swedish Ethical Review Authority (dnr 2018–004). Children and caregivers were informed that participation was voluntary and that they could end at any given time if they so decided, with or without explanation. Children and caregivers were given written and oral information and gave written consent to participate.

Results

Study population

In total, an unselected population of 73 children were invited to participate. All of these children had enuresis as their major complaint and none had sought help for bowel-related symptoms. Of these 73, seven either declined (n = 1), failed to complete the voiding chart (n = 3) or became dry at night spontaneously (n = 3). This left 66 children who could be evaluated at baseline. Among these children, 20 were girls and 46 boys, and their age range was 6–10 (mean 7 ± 1.2, median 7) years. History data in the whole study population (n = 66) showed heredity among parents and siblings (47%), urgency (65%), previous daytime incontinence (53%), high arousal thresholds (86%) and constipation (35%). Further details are shown in Table 1. No child had to be excluded due to pathological results on urodynamic investigation or history signs of underlying LUT pathology.

Comparisons between children with or without constipation

Twenty-three children out of 66 (35%) were classified as having constipation, either due to Rome IV criteria (n = 12) or ultrasonographically dilated rectum (n = 6). The remaining 43 were not constipated. The proportions of girls among the children, constipated and non-constipated was 8/22 (36%) and 12/44 (27%), respectively (p = 0.45), whereas the mean ages were 7 ± 1 and 7 ± 1 (p = 0.47). Six out of 66 children were suspected to be constipated by their parents but only four of those six were constipated according to Rome criteria or rectal ultrasound. History and bladder bowel data of children with or without constipation are shown in Table 2. As can be seen in the table, there were no statistically significant differences between the

Table 1 Voiding chart data, all participating children at baseline (n = 66).

	N	Mean ± 1 SD
Wet nights per two weeks	66	9.9 ± 4.1
Daytime micturition frequency	63	5.4 ± 1.9
Enuresis volume[a]	57	67 ± 50
Urine production per 24 h/kg (mL/kg)	55	27 ± 12
Nocturnal urine production, wet nights[a]	48	117 ± 56
Maximum voided volume, morning void excluded[a]	65	79 ± 31
Maximum voided volume, morning void included[a]	65	87 ± 31
Average voided volume, morning void excluded[a]	65	48 ± 19
Average voided volume, morning void included[a]	65	49 ± 17

[a] All volumes expressed as percentages of expected bladder capacity for the child's age, according to the Koff-Hjälmås formula [1].

Table 2 History and voiding chart data at baseline, constipated and non-constipated children.

	Constipated (n = 23)	Non-constipated (n = 43)	p-value
Heredity, n (%)	13 (57%)	18 (42%)	p = 0.26
Urgency, n (%)	15 (65%)	28 (65%)	p = 0.99
Previous daytime incontinence, n (%)	9 (39%)	22 (51%)	p = 0.35
High arousal thresholds, n (%)	18 (78%)	38 (88%)	P = 0.47
Wet nights per two weeks[a]	9.9 ± 4.1	9.9 ± 4.1	p = 0.93
Daytime micturition frequency[a]	5.1 ± 1.7	5.6 ± 1.9	p = 0.30
Enuresis volume[a,b]	72 ± 37	64 ± 57	p = 0.56
Urine production per 24 h/kg[a]	29 ± 12	27 ± 11	p = 0.47
Nocturnal urine production, wet nights[a,b]	124 ± 44	113 ± 62	p = 0.53
Maximum voided volume, morning void excluded[a,b]	80 ± 34	77 ± 29	p = 0.71
Maximum voided volume, morning void included[a,b]	90 ± 33	85 ± 31	p = 0.57
Average voided volume, morning void excluded[a,b]	49 ± 17	47 ± 19	p = 0.74
Average voided volume, morning void included[a,b]	50 ± 16	49 ± 18	p = 0.76

[a] Data are shown as mean ± 1 SD.
[b] All volumes expressed as percentages of expected bladder capacity for the child's age, according to the Koff-Hjälmås formula [1].

two groups, except for rectal diameter that was part of the definition of constipation. We made the same comparisons between rectally distended and not rectally distended children, but the results were similar (data not shown).

Antienuretic effects of fecal disimpaction

In the group of children with constipation (n = 23), three children did not complete the follow-up data, leaving 20 children to analyze the antienuretic effect of fecal disimpaction. The median number of wet nights at baseline was 11 (range 2–14, mean 9.8 ± 4.1) and after at least two weeks of treatment 10 (range 1–14, mean 9.3 ± 5.1). The mean reduction of the number of wet nights was 0.2 ± 3.5, or expressed in positive percentages mean 19 ± 29. This effect was not statistically significant (p = 0.43). Although we did not find a statistically significant antienuretic effect of the constipation treatment there were three children who reduced their enuresis frequency with more than 50%, i.e. who were partial responders. When comparing these children with the rest of the children with constipation, it was found that the only statistically significant predictor of antienuretic effect of laxative treatment was baseline enuresis frequency, that was lower among the partial responders (4.3 ± 2.5) than in the nonresponding group (10.7 ± 3.6; p = 0.011). The effect of laxative therapy on the numbers of wet nights is highlighted in Fig. 1. During the following randomized eight-week study (published elsewhere) neither constipation status nor constipation therapy did influence treatment result [25].

Effects of the constipation therapy on voiding chart data

One interesting effect was noted: while given laxative treatment the children's voided volumes tended to increase, which is shown in Table 3. Not all families managed

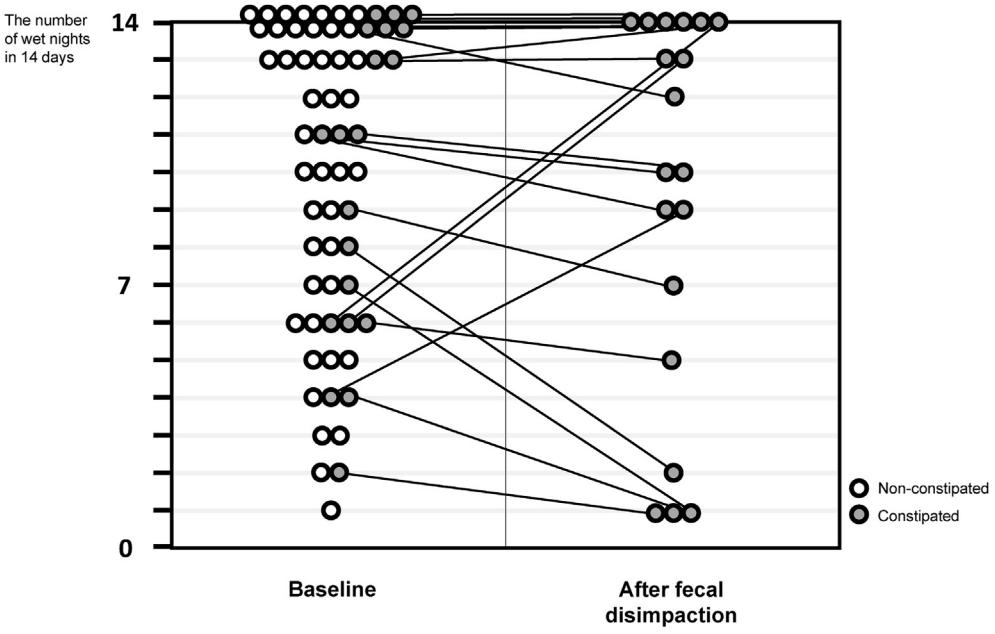


Fig. 1 The number of wet nights in 14 days at baseline, in children with enuresis and no constipation (white) and the number of wet nights in 14 days at baseline compared to wet nights in 14 days, after fecal disimpaction in children with enuresis and constipation (grey).

Table 3 Voiding chart data from constipated children (n = 23), at baseline and during constipation therapy.

	N	Baseline	During therapy	p-value
Daytime micturition frequency[a]	20	5.3 ± 1.7	5.1 ± 1.6	p = 0.39
Enuresis volume[a,b]	16	76 ± 36	70 ± 29	p = 0.56
Urine production per 24 h/kg[a]	15	30 ± 14	33 ± 12	p = 0.25
Nocturnal urine production, wet nights[a,b]	11	127 ± 49	124 ± 27	p = 0.87
Maximum voided volume, morning void excluded[a,b]	19	82 ± 36	98 ± 36	p = 0.006
Maximum voided volume, morning void included[a,b]	19	89 ± 35	100 ± 36	p = 0.081
Average voided volume, morning void excluded[a,b]	19	50 ± 18	60 ± 17	p = 0.13
Average voided volume, morning void included[a,b]	19	50 ± 17	59 ± 16	p = 0.12

[a] Data are shown as mean ± 1 SD.
[b] All volumes expressed as percentages of expected bladder capacity for the child's age, according to the Koff-Hjälmås formula [1].

to produce complete voiding chart data during constipation therapy.

Discussion

We found that starting standard laxative treatment of constipation in children with enuresis and concomitant constipation or fecal dilatation did not, by itself, make the children dry at night, at least not during the disimpaction stage. We also found that children with enuresis, constipated and non-constipated, did not differ regarding daytime bladder function.

The antienuretic effect of laxative therapy in children with enuresis without daytime incontinence has only rarely been studied before [7]. In the 80s, O'Regan et al. examined 25 children with mostly combined daytime incontinence and enuresis, 22 of whom were also found to be severely constipated. In this group, constipation treatment tended to make the children dry within a couple of weeks [28]. It can be assumed that the children examined represented a hard-core population that is not directly comparable to our sample. Our results differ even more from those of an American evaluation of 30 patients with enuresis in which it was, surprisingly, found that every single one of them had a distended rectum on plain radiographs and almost all were cured from their enuresis by laxative therapy [29]. This study was retrospective and we suspect that the population was highly biased. The Aarhus group in Denmark evaluated the treatment of 73 children with combined bladder and bowel dysfunction and found that although treatment of constipation was quite effective against concomitant daytime incontinence, only 17% of children with enuresis had a significant reduction of wet nights [21]. This is more in line with our findings. Finally, the matter was partly addressed in a recent Brazilian study on 82 children with monosymptomatic enuresis, 82% of whom were considered constipated. The study's complicated design makes comparisons difficult, but only seven children became dry at night by constipation treatment [30].

Not many conclusions can be drawn from the few children who were actually helped by constipation therapy in our present study, but the fact that they had a significantly lower enuresis frequency at baseline suggests that they were perhaps about to become dry anyway. It is interesting to note that daytime voided volumes increased during constipation treatment. The effect was not large but it still indicates that treatment does indeed have effects on bladder function, presumably by decreasing DO, although it wasn't enough to make the children dry at night. The assets of our study are that we examined a relevant patient group that is probably representative of children with enuresis at large, constipation was adequately assessed, the drop-out rate was low and enough children were recruited to support our conclusions. But there are some obvious drawbacks.

We do not know whether the constipation treatment actually worked against the constipation, since the children were not again evaluated according to the Rome criteria and no new rectal diameter assessment was made during laxative therapy. Maybe they were still constipated when they completed the second bladder diary. Our choice not to re-evaluate the children rests upon three considerations: first, this was a compromize we had to make for reasons of resources and logistics; second, it also reflects what is feasible in clinical reality: in children without bothersome bowel complaints several months of constipation treatment is not defensible as a first-line treatment. Frequent follow-up visits and repeated examinations have to be reserved for the therapy-resistant cases or those in whom fecal incontinence or other bowel symptoms constitute the main problem. Finally, the therapy was reasonably intense, with repeated enemas, followed by PEG therapy.

Furthermore, we cannot be absolutely sure that the children and guardians adhered to our instructions. Maybe the parents did not give all the mini-enemas and/or PEG therapy as prescribed. But this also reflects clinical reality; and strict control of adherence with home visits by the nurse or by other means would constitute an intervention *per se*, and then we would no longer be assessing standard constipation therapy. Our repeated contacts via telephone did not give any reason to suspect any major lack of adherence. Finally, in Sweden mini-enemas is a fairly uncontroversial therapy.

Although the study was powered to find differences in enuretic episodes pre- and post-constipation therapy, the sample was not large enough to exclude differences in bladder function data between children, constipated and non-constipated. We can thus not exclude that such differences really apply, although we did not find them. With a larger sample we might have been able to see interesting differences between the groups; differences that could have shed more light upon the complex bladder—bowel interaction. The lack of differences in bladder function between children with and without constipation puts further doubt on the role of constipation in (otherwise) uncomplicated enuresis.

Another important question that cannot be answered by the present study is whether constipation treatment, although possibly insufficient by itself, may be crucial in order for specific antienuretic therapy to be efficient. Maybe therapies such as the enuresis alarm and desmopressin will be less successful in constipated children with enuresis unless their bowel disturbance is first properly addressed. We suspect this to be the case, but if not, then constipation that is not bothering the child may possibly be left untreated.

Conclusions

Fecal disimpaction in children with enuresis and concomitant constipation will, by itself, not make the children dry at night. Bowel problems may still need to be addressed, but the child should not be given the false hope that this alone will make them dry at night.

Funding/support

This project is supported by grants from Center of Clinical Research Dalarna (CKFUU-748581, CKFUU-936068), the Swedish Enuresis Academy and the Gillbergska Foundation.

Conflict of interest

The authors have no conflicts of interest relevant to this article to disclose.

Acknowledgments

We are very grateful to all the children and parents who participated in this study.

References

[1] Söderström U, Hoelcke M, Alenius L, Söderling A-C, Hjern A. Urinary and faecal incontinence: a population-based study. Acta Paediatr 2004;93:386—9.
[2] Hägglöf B, Andrén O, Bergström E, Marklund L, Wendelius M. Self-esteem before and after treatment in children with nocturnal enuresis and urinary incontinence. Scand J Urol Nephrol 1997;31:79—82.
[3] Rittig S, Knudsen UB, Nørgaard JP, Pedersen EB, Djurhuus JC. Abnormal diurnal rhythm of plasma Vasopressin and urinary output in patients with enuresis. Am J Physiol 1989;256: F664—71.
[4] Neveus T, Lackgren G, Tuvemo T, Hetta J, Hjalmas K, Stenberg A. Enuresis-background and treatment. Scand J Urol Nephrol Suppl 2000:1—44.
[5] Yeung CK, Chiu HN, Sit FK. Bladder dysfunction in children with refractory monosymptomatic primary nocturnal enuresis. J Urol 1999;162:1049—55.
[6] Austin PF, Ferguson G, Yan Y, Campigotto MJ, Royer ME, Coplen DE. Combination therapy with desmopressin and an anticholinergic medication for nonresponders to desmopressin for monosymptomatic nocturnal enuresis: randomized, double-blind, placebo-controlled trial. Pediatrics 2008;122: 1027—32. https://doi.org/10.1542/peds.2007-3691.
[7] Neveus T, Fonseca E, Franco I, Kawauchi A, Kovacevic L, Nieuwhof-Leppink A, et al. Management and treatment of nocturnal enuresis-an updated standardization document from the International Children's Continence Society. J Ped Urol 2020;16: 10—9. https://doi.org/10.1016/j.jpurol.2019.12.020.
[8] Cederblad M, Engvall G, Sarkadi A, Nevéus T. No effect of basic bladder advice in enuresis — a randomised controlled trial. J Ped Urol 2015;11:153e1—5. https://doi.org/10.1016/j.jpurol.2015.03.004.
[9] Glazener CM, Evans JH. Desmopressin for nocturnal enuresis. Cochrane Database Syst Rev 2002:CD002112.
[10] Mugie SM, Benninga MA, Di Lorenzo C. Epidemiology of constipation in children and adults: a systematic review. Best Pract Res Clin Gastroenterol 2011;25:3—18.
[11] Rasquin A, Di Lorenzo C, et al. Childhood functional gastrointestinal disorders. Child/adolescent Gastroenterology 2006; 130:1527—37.
[12] Benninga MA, Faure C, Hyman PE, St James Roberts I, Schechter NL, Nurko S. Childhood functional gastrointestinal disorders: Neonate/Toddler. Gastroenterol 2016. https://doi.org/10.1053/j.gastro.2016.02.016.
[13] Veiga ML, Lordêlo P, Farias T, Barroso C, Bonfim J, Barroso UJ. Constipation in children with isolated overactive bladder. J Pediatr Urol 2013;9:945—9.
[14] Burgers R, Liem O, Canon S, Mousa H, Benninga MA, Di Lorenzo C, et al. Effect of rectal distention on lower urinary tract function in children. J Urol 2010;184:1680—5.
[15] Panayi DC, Khullar V, Digesu GA, Spiteri M, Hendricken C, Fernando R. Rectal distension: the effect on bladder function. Neurourol Urodyn 2011;30:344—7.
[16] Franco I. New ideas in the cause of bladder dysfunction in children. Curr Opin Urol 2011;21:334—8.
[17] Duel BP, Steinberg-Epstein R, Hill M, Lerner M. A survey of voiding dysfunction in children with attention deficit-hyperactivity disorder. J Urol 2003;170:1521—4.
[18] McKeown C, Hisle-Gorman E, Eide M, Gorman GH, Nylund CM. Association of constipation and fecal incontinence with attention-deficit/hyperactivity disorder. Pediatrics 2013;132: e1210—5.
[19] Franco I. Pediatric overactive bladder syndrome. Pathophysiology and management. Pediatr Drugs 2007;9:379—90.
[20] Chung JM, Lee SD, Kang DI, Kwon DD, Kim KS, Kim SY, et al. An epidemiologic study of voiding and bowel habits in Korean children: a nationwide multicenter study. Urology 2010;76: 215—9.
[21] Borch L, Hagstroem S, Bower WF, Siggaard Rittig C, Rittig S. Bladder and bowel dysfunction and the resolution of urinary incontinence with successful management of bowel symptoms in children. Acta Paediatr 2013;102:e215—20. https://doi.org/10.1111/apa.12158.
[22] Burgers RE, Mugie SM, Chase J, Cooper CS, von Gontard A, Rittig CS, et al. Management of functional constipation in children with lower urinary tract symptoms; Report from the Standardization Committee of the International Children's Continence Society. J Urol 2013;190:29—36.
[23] McGrath KH, Caldwell PHY, Jones MP. The frequency of constipation in children with nocturnal enuresis: a comparison with parental reporting. J Paediatr Child Health 2008; 44:19—27.
[24] Rodriguez-Ruiz M, Mendez-Gallart R, Garcia Merida M, Somoza-Argibay I. Influence of constipation on enuresis. An Pediatr (Engl Ed). 2020. https://doi.org/10.1016/j.anpedi.2020.06.016.
[25] Borgström M, Bergsten A, Tunebjer M, Hedin Skogman B, Nevéus T. Daytime urotherapy in nocturnal enuresis: a randomised, controlled trial. J Archives Disease Child 2022. archdischild-2021-323488, https://doi.org/10.1136/archdischild-2021-323488.
[26] Austin P, Bauer S, Bower W, Chase J, Franco I, Hoebeke P, et al. The standardization of terminology of lower urinary tract function in children and adolescents: update report from the standardization committee of the International Children's Continence Society. J Urol 2014;191:1863—5. https://doi.org/10.1016/j.juro.2014.01.110.
[27] Ring IJ, Neveus T, Markstrom A, Magnuson A, Bazargani F. Rapid maxillary expansion in children with nocturnal enuresis: a randomized placebo-controlled trial. Angle Orthod 2020;90: 31—8. https://doi.org/10.2319/031819-219.1.
[28] O'Regan S, Yazbeck S, Hamberger B, Schick E. Constipation a commonly unrecognized cause of enuresis. Am J Dis Child 1986;140:260—1. https://doi.org/10.1001/archpedi.1986.02140170086039.
[29] Hodges SJ, Anthony EY. Occult megarectum-a commonly unrecognized cause of enuresis. Urology 2012;79:421—4. https://doi.org/10.1016/j.urology.2011.10.015.
[30] Fagundes SN, Lebl AS, Azevedo Soster L, Sousa e Silva GJ, Silvares EF, Koch VH. Monosymptomatic nocturnal enuresis in pediatric patients: multidisciplinary assessment and effects of therapeutic intervention. Pediatr Nephrol 2017;32: 843—51.