

Nocturnal Enuresis

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Abstract

Nocturnal enuresis, or involuntary urination, is a common problem among children. It affects approximately 15% of all children at 5 years old. At our workplace as a primary health care facility, nocturnal enuresis, and incontinence in general, is one of the most common chief complaints presenting to the clinic.

Enuresis can be disruptive to normal family life and can generate stress between parents and child. There may be anxiety about events like sleepovers and campouts and there are significant costs in lost time, laundry and bedding, as well as the potential for guilt and loss of self-esteem.

Nocturnal enuresis decreases with age, with a spontaneous remission rate of about 15% per year. It can improve with treatment, and improved self-esteem and quality of life have been reported after successful treatment. It is therefore important to offer timely treatment, and to refer children for specialist care when treatments are not effective.

In this review we discuss definition, epidemiology, etiology, evaluation and different modalities of treatment for nocturnal enuresis .

Key words: Nocturnal enuresis, alarm, desmopressin .

Definition

Nocturnal enuresis refers to the involuntary loss of urine during sleep that occurs at least twice a week in children older than 5 years of age for at least 3 months, and it is the most common urologic complaint in pediatric patients [1][2]. To avoid confusion, the International Children's Continence Society has defined enuresis as wetting that occurs at night, whereas they no longer refer to daytime incontinence as diurnal enuresis [2].

Nocturnal enuresis is classified into primary enuresis and secondary enuresis. Primary enuresis is when it occurs in a child who has not been dry for at least 6 months, whereas secondary enuresis is the one that has an onset after a period of nocturnal dryness of at least 6 months [2][3]. Also, the enuresis is classified as monosymptomatic or non-monosymptomatic, with the latter correlating with daytime incontinence or other lower urinary tract symptoms like urgency[5].

According to the International Children's Continence Society (ICCS), two main groups can be distinguished for intermittent incontinence: nocturnal enuresis, and functional daytime urinary incontinence [6].

Epidemiology

Nocturnal incontinence occurs in 12% to 25% of 4-year-old children, 7% to 10% of 8-year-old children, and 2% to 3% of 12-year-old children [7]. Enuresis is more common in boys when compared to girls, with a ratio of 3 to 1, but this difference tends to decrease after age of 10[3][5].

Etiology

Enuresis is a complex condition to which genetic, physiological, and psychological factors contribute. Some patients have a definite cause of enuresis or urinary incontinence, like neurogenic bladder, detrusor overactivity, vaginal reflux, or stress incontinence [8][9].

Factors that are believed to contribute to enuresis include:

Genetics: there is a strong association with parental history of childhood enuresis. The overall odds ratio of having nocturnal enuresis and urinary incontinence was 10.1 times higher if the father or mother also had a history of nocturnal enuresis or urinary incontinence [10][11].

Defective sleep arousal: In most children with enuresis the arousal response is defective during sleep. When urine volume exceeds bladder capacity, bedwetting occurs [12]. Although arousability is reduced, the sleep architecture itself is usually unaltered, and enuresis occurs in all sleep stages, particularly during non-REM (rapid eye movement) sleep [13].

Nocturnal polyuria: According to case-control studies, many children with nocturnal enuresis have an altered diurnal rhythm of vasopressin secretion [14,15], resulting in the production of excessive amounts of relatively dilute urine overnight. The expected bladder capacity is calculated by the formula: (age in years +1)×30 mL, which is valid from 2 to 12 years. Nocturnal polyuria is defined as greater than 130% of the expected bladder capacity for age.

Bladder factors: In children with nocturnal enuresis, the emptying reflexes of the full bladder are not adequately inhibited during sleep, resulting in involuntary voiding [16]. The pontine micturition centre of the brain stem is involved in this process.

Psychiatric disorders in children with enuresis are higher than the rate found in the non-enuretic groups but the relationship may be of etiologic relevance or it may be coincidental or occurring in response to the symptom of enuresis [17]. Children with enuresis had 2.88 times increased odds (95%CI: 1.26-6.57) of having attention deficit hyperactivity disorder (ADHD) as compared with those without enuresis [18]. It has been suggested that both enuresis and ADHD might be related to delays in central nervous system maturation [19].

Evaluation

Evaluation of a child with enuresis consists of detailed history, focused examination and appropriate investigations.

A careful history should be obtained and a thorough physical examination should be performed. Careful questioning of parents and children can be extremely helpful in determining the type of enuresis and a possible cause or contributing factors.

Parents often are not fully aware of their child's daily voiding habits. Thus, a voiding diary may need to be maintained for a week or more. The family should keep track of how many times the child voids during the day and how many nights the child wets the bed. Key questions should include periods of dryness, stress in family, family history of enuresis, bowel control, peer interactions and emotional changes. Never forget to ask about urinary infection symptoms (frequency, volume, stream, retention, urgency, and dysuria); also enquire about age and results of previous therapy and other health problems and medications. Voiding history questionnaires are useful and may be obtained from the National Kidney Foundation on The World Wide Web [20].

A history of snoring, mouth breathing, behavioral problems and daytime somnolence in patients with enlarged tonsils or adenoids may suggest obstructive sleep apnea. Surgical correction of airway obstruction in these patients improves or cures nocturnal enuresis and daytime wetting [21].

The physical examination is often unrevealing but helps to exclude less common anatomic or neurologic problems. A full physical examination is required for each child, especially for the abdomen, spine, anal and genital regions, and the lower extremities [22].

Investigations :

Investigations are usually minimally required in children with monosymptomatic nocturnal enuresis.

Urinalysis: Urinalysis should be performed in all children with monosymptomatic enuresis [23].

Imaging for selected patients: Urologic imaging (renal sonogram and voiding cystourethrogram) is reserved for children who have significant daytime complaints, a history of UTI(s) not previously evaluated, and/or signs and symptoms of structural urologic abnormalities [23,24]. Abdominal radiograph although rarely used for determining the presence and/or extent of stool retention is also helpful in convincing the parents about the severity of the constipation [25].

Treatment

Nocturnal enuresis is considered normal at least till 5 years. Even subsequently need for intervention is often not a medical decision being influenced primarily by the family and the child's perception towards enuresis. **Education:** The first step in treating primary nocturnal enuresis is to educate the child and parents about the condition and provide reassurance regarding spontaneous resolution (annual cure rate is 15%) [26,27].

Motivational therapy: includes reassurance, emotional support, eliminating guilt, and encouraging the child to take responsibility for the enuresis [28].

Avoid ineffective and even potentially harmful strategies, such as fluid restriction, retention control training (encouraging the child not to void for as long as possible to expand bladder capacity), and unnecessary drugs. Rewarding agreed behaviour (such as drinking adequately, voiding before sleep, and engaging in management) may be more effective than rewarding dry nights, which are out of the child's conscious control [19]. Although simple behavioral therapies are superior to no active treatment, they are inferior to confirmed effective treatments [29].

Bed-Wetting Alarm

The concept of using an alarm that emits a sound when a child wets the bed was first introduced in 1938[30]. The bed-wetting alarm has been shown to be the most effective treatment for nocturnal enuresis [31]. Compared with other skill-based or pharmacologic treatments, the bed-wetting alarm has a higher success rate (75 percent) and a lower relapse rate (41 percent) [32]. For resolution of nocturnal enuresis, the bed-wetting alarm may need to be used for up to 15 weeks.

Improved technology has made the bed-wetting alarm a more attractive option than in the past. Alarms are now smaller and lighter, and they can be equipped with a buzzer, rather than a sound alarm, for children who do not respond to an alarm sound or for households in which an alarm disrupts the sleep of others.

Disadvantages include the need for active parental participation to help wake the child (a major factor in failure). The potential inability of the alarm to awaken the child or parents, and the presence of external hardware. Relapse rates average 42 % (range 4%-55%) [33][34].

Pharmacotherapy :

Medication should be initiated in children seven years and older only if nonpharmacologic measures fail. Children who do not respond to one or more measures may benefit from combined treatment strategies (e.g., combining nonpharmacologic and pharmacologic treatment or multiple pharmacologic therapies).

Two medications, Desmopressin and imipramine have proven efficacy in the treatment of enuresis.

Desmopressin (DDAVP) is a synthetic ADH, and in tablet or nasal form.

About 30 to 60 minutes before falling asleep, tablets of 0.2–0.4 mg, or melt tablets of 120–240 µg, are administered orally. Because of the rare adverse effect of water intoxication, the fluid intake should not exceed 250 mL afterwards. If the child does not attain dryness after four weeks, the medication should be discontinued. If the effects are positive, desmopressin can be taken for three months (after which an attempt at withdrawal should be made without tapering doses). With desmopressin, about 30% of children attain complete dryness, and 40% partial dryness; however, the relapse rate is about 50% [35].

In a systematic review of 47 trials, desmopressin (standard dose) had some effect during treatment in about 70% of children. Most experienced a reduction in the amount and frequency (by one to two nights/week) of bedwetting compared with placebo (weighted mean difference (WMD) -1.33, -1.67 to -0.99), although less than half became completely dry (relative risk for failure 0.81, 0.74 to 0.88) [36].

Imipramine: Imipramine is approved for use in treating nocturnal enuresis in children aged 6 years and above. A systematic review of 58 trials showed that imipramine and other tricyclic antidepressants can be effective, 49 with a reduction in the frequency of bedwetting by one night per week compared with placebo (WMD -0.92, -1.38 to -0.46). About a fifth of the children became dry while on treatment (relative risk for failure 0.77, 0.72 to 0.83). This effect was not sustained after treatment stopped, with no difference between tricyclics and placebo (relative risk 0.98, 0.95 to 1.03) [37].

Other Approaches :

Various nonpharmacologic treatments have been shown to have a positive effect on bed-wetting in small studies but have not been extensively evaluated (generally weak strength of evidence). These approaches include an elimination diet [38], hypnosis [38], retention control (i.e., holding urine for progressively longer periods) [39], biofeedback [40], acupuncture [41], scheduled awakenings [42] and caffeine restriction [43].

Referral: Further assess or refer children with nocturnal enuresis if they have severe daytime symptoms, a history of recurrent urinary tract infections, abnormal renal ultrasound results, known or suspected physical or neurological problems, comorbid conditions (such as fecal incontinence; diabetes; and attention, learning, behavioural, or emotional problems), or family problems. Also refer those who have not responded to treatment after six months [44].

Conclusion

Nocturnal enuresis is a disorder in which episodes of urinary incontinence occur during sleep in children ≥ 5 years of age. Enuresis can be categorized into monosymptomatic (MEN) and nonmonosymptomatic (NMEN) forms. MEN occurs without any other symptoms of bladder dysfunction. NMEN is associated with dysfunction of the lower urinary tract with or without daytime incontinence.

Genetic, physiological, and psychological factors contribute to the etiology of nocturnal enuresis.

A careful clinical history is fundamental to the evaluation of enuresis. Diagnostic procedures include medical history and psychological screening with questionnaires, bladder and bowel diary, physical examination and urinalysis. Imaging and urodynamic studies generally are not needed unless specifically indicated. Treatment must involve both the child and family and take into consideration the possible pathophysiological mechanisms. A behavior modification program is the treatment of choice, including alarm, positive reinforcement, charting of progress to increase confidence and self-esteem and avoiding psychological trauma through blame or punishing the child.

Alarm therapy remains the first-line treatment modality for nocturnal enuresis. Desmopressin is the most commonly used medical treatment. It is the choice of treatment where alarm therapy is not available, or in addition to alarm therapy if that has failed when used alone.

The most important message for children are : it is not your fault, you are not alone it will get better.

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