Enuresis: Evaluation and Treatment

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Abstract

Enuresis is a common pediatric problem that creates a lot of stress for both the child and his/her family. Unfortunately, many of these patients do not seek medical attention for evaluation and treatment. It is important in the care of the child with enuresis to understand the definitions of the disorder, routinely ask about bowel and bladder habits, clarify the nature of the wetting (daytime, nighttime, or both) in the child, and perform a thorough history and physical examination. Laboratory studies are often minimal. Treatment (behavioral or medicinal) is dependent on the type of enuresis present, and patient compliance. Successful management of enuresis has benefits to both the child and family. **[*Pediatr Ann*. 2015;44(4):133-137.]**

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Enuresis is a common pediatric condition. Many office visits for evaluation are made due to the strain it puts on the family and the child. Most cases of enuresis are benign without associated anatomic, neurologic, or behavioral abnormalities.

However, in evaluating enuresis, it is important to differentiate daytime wetting from nighttime wetting, and whether enuresis is a primary or secondary condition. The International Children's Continence Society established new definitions in 2006 to help in the classification of enuresis (**Table 1**). Monosymptomatic enuresis (MSE) occurs without any associated daytime symptoms, whereas nonmonosymptomatic enuresis (NMSE) is associated with daytime wetting. Primary enuresis occurs when a child has never been dry for 6 months; secondary enuresis is when a child who has been dry for greater than 6 months starts to wet.[1] Children are not considered to have enuresis until age 5 years, or for children with developmental delay (older than age 5 years) until they reach the cognitive level of a 4-year-old.

MONOSYMPTOMATIC ENURESIS

A child with MSE has a history of not being dry on more than 2 consecutive nights. MSE occurs in 10% to 15% of 7-year-olds (roughly 5 to 7 million children) with boys affected more than girls.[2,3] Roughly 15% of children become dry at night annually so that by age 15 years only 1% still exhibit MSE. If the parents have a history of bedwetting, then the likelihood of their child developing MSE increases (43%-44% chance if one parent and 77% chance if both parents).[2] Other factors may also contribute to MSE.

Nighttime production of urine is about half that of daytime production. Children with MSE produce more urine at night (nocturnal polyuria) than those children without MSE. This is thought to be due to changes in vasopressin secretion.[4] However, a child with nocturnal polyuria who arouses to urinate and does not wet the bed, does not have enuresis.

The average bladder capacity for a child is his or her age plus 1 oz. Studies show similar urodynamic studies of bladder function (muscle) and size between children with and without MSE, but also show that children with MSE may exhibit decreased functional capacity (volume at which bladder empties).[3,5]

Psychologic factors are not felt to contribute to MSE, but may develop

TABLE 1.

Classification of Enuresis

Monosymptomatic

Nighttime wetting

No bladder dysfunction

No daytime symptoms of the following

- Urgency
- Leakage or wetting
- Hesitancy
- Frequency
- Pain
- Sensation of incomplete emptying

Nonmonosymptomatic

Daytime wetting

Nighttime wetting possible

Daytime symptoms of the following

- Urgency
- Leakage or wetting
- Hesitancy
- Frequency
- Pain
- Sensation of incomplete emptying

Bladder dysfunction

- Emptying abnormality
- Storage abnormality

Note: Enuresis can be classified as primary, never having been dry; and as secondary, a history of being dry for at least 6 months in the past.
Adapted from Neveus et al.[1]

because of it. Attention-deficit/hyperactivity disorder (ADHD) and mild developmental delays may contribute to MSE.[2,6]

Many parents say that their children are "deep sleepers," and do not arouse to urinate. Sleep studies have not been able to correlate this to any particular phase of sleep. Children with obstructive sleep apnea (OSA) do have a higher incidence of MSE.[3]

NONMONOSYMPTOMATIC ENURESIS

A child with NMSE has a history of daytime (and often associated nighttime) wetting. Although these children may have the same issues of MSE, their daytime wetting is associated with other problems. NMSE can range from leaking or dribbling to true wetting. Parents state that daytime wetting is a major stress factor for their children. The psychological impact of trauma (abuse) and loss (death, divorce) may contribute to NMSE; as with MSE, there is a higher incidence of NMSE in children with ADHD.[3]

Children with NMSE should be evaluated for the inability to effectively store urine, empty the bladder, or both.[1,3] The bladder fills under low pressure while the bladder neck and proximal urethra musculature tighten to increase outlet resistance (under the influence of norepinephrine and the sympathetic nervous system). With urination, outlet resistance falls as the bladder contracts (under the influence of acetylcholine and the parasympathetic nervous system).[3] Coordination of this effort requires an intact nervous system, appropriate cognitive development, and normal anatomy.

Storage problems occur when the bladder does not fill at low pressure, the bladder is under high pressure (as in a child with cerebral palsy), hypersensitive (due to urinary track infection [UTI] or constipation), or there is poor sphincter control. Emptying problems occur when the bladder won't empty completely, voluntarily, or at low pressure.[3] The presence of residual urine (>20 mL in young children or 10% of bladder volume in adult-size children on bladder ultrasound 5 minutes after voiding) is indicative of an emptying problem.[1]

EVALUATION OF ENURESIS

When evaluating a child for enuresis, it is important to perform a thorough history and physical examination. The history should ask about the age of toilet training for both bladder and stool, frequency of urination during the day (normal is 4 to 7 times daily),[1] and if there is associated nighttime wetness and its frequency. A description of the degree of wetness should also be obtained (leaking, true urination, or intermittent dribbling), and when it occurs. Also, the inquiries regarding a sense of urgency (can't wait to get to bathroom), difficulty expressing urine, dysuria, nature of the urine stream (weak, strong, or intermittent) should be made. A history for cognitive delays, UTI, abuse, social disruptions/stressors, renal abnormalities, or neurologic disorders should be obtained. The onset of enuresis should be determined (acute or chronic), and if the child has ever been dry during the day or night. A history of bowel habits should be obtained to determine if constipation or encopresis are present. Sleep patterns with particular attention to snoring should be made. Family history for enuresis should be documented. A dietary history should be taken to assess use of caffeine/chocolate, drinking history including dairy and carbonated beverages (alcohol for teens), volume of liquids each day, and the time of day fluid is consumed. Medications should be reviewed with the child and his/her family, and any signs or symptoms of diabetes mellitus.

Vaginal reflux (incontinence within 10 minutes of voiding in toilet-trained girls), giggle incontinence (solely associated with laughter between ages 10 and 20 years, and mostly girls and young women), and pollakiuria (extremely frequent voiding in children between ages 3 and 8 years without daytime urine incontinence) are not considered enuresis.[1]

On physical examination, the child should be assessed for general cognitive level/ability. An evaluation of muscle strength, sensation, deep tendon reflexes, tone, and absence or presence of Babinski sign should be performed. An abdominal examina-

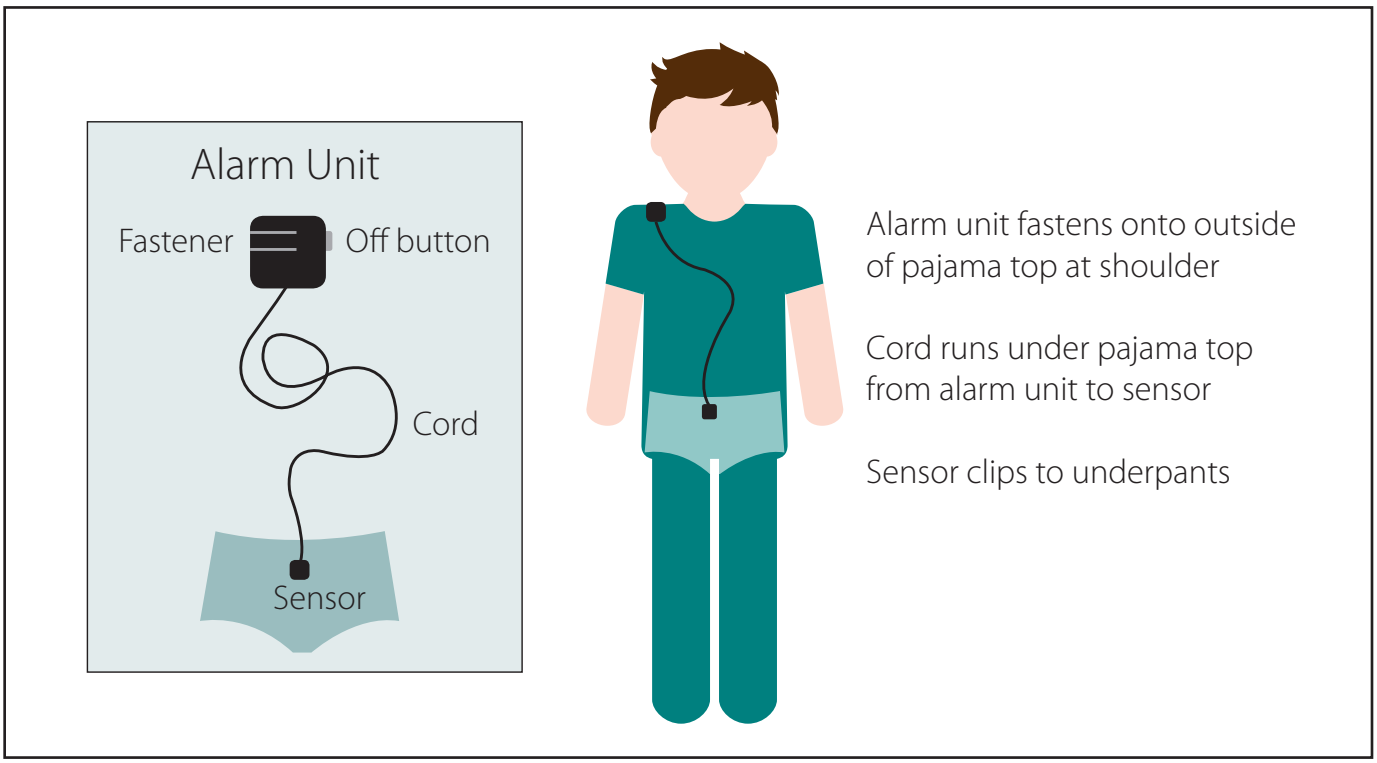

Figure 1. Diagram of an enuresis alarm unit set up.

tion for distention, masses, or palpable stool should be made. On genitourinary examination, initial checking for wetness should be conducted. An evaluation for genital malformation, assessment of the urethral opening, and inspection of the vaginal area for labial adhesions or masses should also be performed. Perineal skin irritation may indicate chronic leaking or concerns for abuse. Eliciting an anal wink and checking the underwear for stool (streaks or true stool) should occur. The lumbar-sacral area should be inspected for bony defects, hairy tuft, hemangioma, or dimple.

Obtaining a bladder diary over 3 to 4 days to assess urinary frequency, bladder volume, and quantitate times of wetness is helpful. In some cases, bowel movements (appearance, size, and frequency) may be beneficial to document.

Initial laboratory studies include a urinalysis. In the case of MSE, this is sufficient. Further laboratory or imaging studies would be warranted if evidence of renal disease, diabetes mellitus, diabetes insipidus, or UTI exists.

For children with NMSE, a urine culture should be obtained. Bladder ultrasound to evaluate bladder wall thickness and postvoid residual is important.[5] Uroflow testing to evaluate the child's urine stream can be conducted. This study electronically records the urine pattern of the child, and gives a quantitative and qualitative assessment. Uroflow testing is good to determine the presence of urge incontinence, emptying abnormalities, or true obstruction (eg, posterior urethral valves or urethral stricture).[3]

Urodynamic studies are recommended for children who don't respond to treatment or if there is a suspicion for tethered spinal cord (neurologic signs and symptoms, including NMSE or loss of neurologic skills/ function, and encopresis). Magnetic resonance imaging (MRI) of the spinal cord is recommended for children with physical findings of tethered cord or suggestive urodynamic test results.[3]

With constant leakage in girls, evaluation for ectopic ureter and urology referral should be considered. Intravenous pyelogram, contrast computed tomography, or MRI of the urologic system are tests that aid in the evaluation.[3] In children with suspected OSA, a sleep study and a referral to an ear, nose, and throat specialist should be made.

TREATMENT

Treatment of MSE should start with behavior modification. Carbonated beverages, citrus juices, and caffeine should be removed from the diet. Dairy products should be avoided at least for 4 hours prior to sleep, and fluids minimized 2 hours before sleep. The child should urinate right before bedtime.[3,6]

TABLE 2.

Treatment Options for Enuresis

DDAVP (desmopressin)
- 0.2-0.6 mg QHS orally (may crush tablet)
- Give half before bedtime
- Duration up to 9 hours
- Avoid with illness and risk of dehydration
- Side effects include hyponatremia and water intoxication
- Approved for children older than age 6 years

Oxybutynin
- 5-15 mg bid to tid for short-acting form
- 5-15 mg daily for extended release (approved for children older than age 6 years)
- 0.15-0.20 mg/kg bid to qid (maximum 15 mg/day)
- Side effects include dry mouth, flushing, constipation, blurred vision

Imipramine
- 25-50 mg orally QHS (for children younger than age 12 years)
- Up to 75 mg orally QHS (for children older than age 12 years)
- Approved for children older than age 6 years
- Side effects include hypotension, anxiety, increased appetite
- Avoid with monoamine oxidase inhibitors and SSRI medications
- Risks of cardiac arrhythmia at high doses

Doxazosin
- 0.5 mg starting dose orally
- Increase to 1 mg daily over 1 month
- Use in older children
- Side effects include hypotension, blurred vision, dizziness, and fatigue

Abbreviations: bid, twice per day; QHS, every night at bedtime; qid, four times per day; SSRI, selective serotonin reuptake inhibitor; tid, three times per day.
Adapted from Graham and Levy,[3] Robson,[5] and the application software Epocrates (an athenahealth service, San Franciso, CA).

The use of an enuresis alarm is most effective (**Figure 1**). The child and family must be invested in the treatment. The alarm needs to be worn nightly for 2 to 4 months, and the child should wear underwear. With dampness, the alarm sounds awakening the child to use the toilet. If the child does not arouse, the parent should wake the child.[6] The duration of treatment and initial disruption of sleep often lead to noncompliance, and treatment failure. Success (14 to 30 days of sleep without alarms) is obtained in about two-thirds of children.[3,6]

Medications can be used to treat MSE (**Table 2**); however, they do not resolve the MSE as do the alarm or time. Desmopressin (DDAVP) reduces nighttime urine production. The pill is preferred over the intranasal spray due to higher risks of hyponatremia associated with the spray.[3,4] Use of DDAVP should be held in case of illness (especially gastroenteritis), dehydration, or fever. DDAVP should be taken 30 minutes before bed. The pill can be crushed for those who cannot swallow the medication. DDAVP can be used regularly or intermittently (for overnight camp or sleepovers for example). Some recommend discontinuing the daily use of DDAVP every 6 months to reassess the patient for MSE or nocturnal incontinence.[3] Unfortunately, 80% to 100% of children will relapse with discontinuation of DDAVP.[2]

Oxybutynin is an anticholinergic medication that may benefit a child with low functional bladder capacity as well as MSE or NMSE. It is more effective when used with DDAVP.[3] The side effects include constipation, dry eyes and mouth, fatigue, flushing, and light-headedness.

Imipramine is a tricyclic antidepressant that helps with enuresis. It appears to work as an anticholinergic on the bladder and increase antidiuretic hormone secretion. Sleep arousal may also be influenced by imipramine. Side effects include fatigue, dizziness, nausea, anxiety, and changes in appetite and sleep. Overdose can cause seizures and cardiac arrhythmia.[3]

Children with daytime wetting need to have a bathroom ritual and bowel program initiated. The child should have a set bathroom time daily for 15 to 20 minutes where he/she is not "rushed" or bothered. For the smaller child, a foot stool to support the feet is helpful. This set time allows for relaxation of the child (and pelvic musculature) and improves bowel and bladder routine.[5] Constipation can also be managed with fluids (especially water), regular exercise, and a ruffage diet. The use of polyethylene glycol is beneficial if the child does not respond to noninvasive therapy. Regular use for 2 to 3 months to obtain bowel regularity and normal tone for emptying should be discussed with the family. A bathroom and bowel program may also benefit the child with MSE.

The treatment plans for MSE discussed above (alarm and medications) can also be used for the nocturnal incontinence component of NMSE. The use of oxybutynin for storage problems and doxazosin (alpha-blocker antihypertensive) for emptying problems are available.[3] Other medications are available for the management of

NMSE but not yet approved for use in children, and are not discussed here. Referral to the appropriate subspecialist for treatment of neurologic, anatomic, or psychiatric problems should be made where indicated.

CONCLUSION

Enuresis is a common pediatric problem that creates various degrees of stress to both the child and his/her family, and accounts for many visits to the pediatrician. Unfortunately, however, enuresis often will go unreported (in about two-thirds of MSE cases)[2] because of the "embarrassment" associated with wetting. Pediatricians should ask about bowel and bladder habits at routine care visits. The terminology is varied in enuresis. Appropriate evaluation and treatment based on obtaining a detailed history and thorough physical examination will benefit the child and family.

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