Solutions for nocturnal bedwetting in children

There is no one way of resolving nocturnal enuresis, and a number of options are available, write Cathy Gibbons and Alf Nicholson

NOCTURNAL ENURESIS can be defined as involuntary voiding of urine occurring at night at an age when the majority of children have achieved continence. It is one of the most common problems in general paediatrics and indeed general practice, and is at times one of the most difficult to manage satisfactorily. It affects approximately 25% of children at age four and only 5-10% of those aged seven. By age 10, only 5% will still wet the bed and the rate of spontaneous resolution is approximately 15% per year throughout the teenage years, leaving a very small percentage still suffering from the condition by age 18. It affects boys more than girls and the prevalence would appear to be similar in most countries with no obvious racial differences.

Case study
Jonathan is an eight-year-old boy who is brought to the surgery by his parents who are very worried that he has never had a dry night since he was born. They feel he is too old to be still wetting the bed every night, and are upset that it has now affected his school life and his ability to stay overnight at friends’ houses. They are worried it is their fault or that maybe Jonathan’s bladder is not working correctly. Jonathan’s father remembers having a similar problem when he was small and finding it very distressing.

• Based on the history above what would be your primary differential diagnosis?
• What would be the salient points in the history to take note of?
• Are there any further important questions to ask?
• How would you manage this child?
• Do they need referral to a paediatrician?

Classification
Nocturnal enuresis (NE) can be subdivided into either primary or secondary enuresis and may be isolated or may be associated with involuntary daytime voiding. A child with primary NE is one who has never managed nocturnal continence, whereas secondary NE, which makes up 25% of all cases, applies to those who have achieved continence, usually for longer than six months, before the onset of episodes.

Physiological development of continence
Voiding in early life is not under conscious control and involves uninhibited bladder contraction secondary to bladder filling. It may also be initiated by stimulating activities or exposure to the cold. As the child grows, there is progressive maturation of this system whereby the child becomes aware of bladder filling followed by an ability to ignore detrusor contraction signals and finally gains control of sphincter relaxation, thus attaining continence. Supportive evidence of this maturation process has been identified in distinct EEG changes in children at night as they develop control.

Aetiology
Maturational delay
A delay in the natural development of continence as
described above is felt to be the most common reason for the persistence of nocturnal enuresis. The strength behind this argument lies in the fact that the vast majority of children with NE will achieve continence with time. There is an inability of the child to wake during sleep in response to the need to void.

**Reduced bladder capacity**

Some children have constitutionally small bladders and thus may end up with a full bladder towards the end of the night and thereby needing to void.

**Inability to wake during sleep in response to need to void**

This is a fundamental problem for all children with enuresis and is felt to be due to a disorder of brainstem arousal that allows us to wake in response to stimuli judged to be of importance.

**Genetics**

It is well known that NE is a strongly inherited trait. When there is one parent with a history of enuresis, the risk in progeny is 44%, this rises to 77% when both parents have a history of it. There is also a two-fold increase in incidence in monozygotic twins compared with their dizygotic counterparts. There have been a number of gene loci linked with enuresis including chromosomes 13q, 12q, 5 & 22q11. Unfortunately, this knowledge has not led to any new treatments.

**Nocturnal polyuria**

Urine production normally falls at night to about 50% of daytime levels, but in enuretics, there is nocturnal polyuria due to a lack of the normal nocturnal increase in vasopressin (ADH) secretion. This explains the response of two-thirds of children with nocturnal polyuria to desmopressin treatment.

**Psychological issues**

These have been blamed in the past, but psychological issues are far more likely to be associated with the development of secondary enuresis and have not been shown to be positively correlated with the presence of primary enuresis.

**Underlying medical condition**

In certain cases there may be an underlying medical cause for their enuresis, particularly if there is a daytime element to it. Spinal dysraphism and polydipsia secondary to either diabetes mellitus (DM) or diabetes insipidus (DI) are extremely rare differential diagnoses. The prevalence of enuresis in sickle cell disease is higher than normal and is thought to be due to chronic sickling compromising renal concentrating capacity. Adenotonsillectomy improves enuresis in a significant number of children with obstructive sleep apnoea.

**Investigations**

In general, a thorough physical examination and history are enough to elicit a diagnosis of uncomplicated NE without the need for extensive investigations. Urine microscopy and culture is an appropriate screening tool. Beyond this, further investigations should be guided by findings on exam or in the history.

**Management**

In general, treatment is not recommended before the age of eight years. A well-motivated child and family are very important in increasing the chances of a successful outcome. It is vital that the child and family understand that treatment is by no means an exact science and will require lengthy input from all members for a real chance at success. Management can be broadly divided into preliminary, non-pharmacological and pharmacological.

**Preliminary approach**

**The family**

Many children experience significant negative feedback in response to their condition, which may include punishments for accidents. It is vital to challenge this approach with the family as a whole, explaining the unconscious nature of the condition and the impact that such a negative approach can have on their self-esteem and indeed, on the problem itself. Emphasis must be placed on praise and positive feedback for dry nights and a no-blame approach adopted when accidents do occur. An explanation of the condition should be given to the family and child and reassurance that the vast majority of cases will resolve.

**Motivation**

Motivational techniques are particularly suited to younger children who respond favourably to reward schemes. The use of a ‘star chart’ or some form of visual response to a dry night is the method most commonly used. Whereas there were some early favourable results in trials using this method, some quoting a 70% reduction in symptoms, a Cochrane systematic review in 2004 showed that many of these were small and not of high quality and suggested that further research was necessary. To date, no high-quality trial has shown conclusive efficacy using this approach, however these techniques do serve to highlight the problem to the child and allow parents to support a positive reinforcement approach to the problem, which has been shown to be effective.

**Oral intake**

Children should be encouraged to drink freely during the day with a reduction in fluid intake in the evening, but not
so much that the child feels thirsty or punished. Caffeine should be avoided after dinner.

**Voiding**

There should be an emphasis on regular voiding of the bladder throughout the day with an avoidance of overfilling and withholding of urine. Children should void upon waking and regularly throughout the day. Towards the evening they should void after dinner and before bed.

**Non-pharmacological**

There is a great deal of research regarding the use of lifting and alarms for the treatment of enuresis, however it is confusing and can be quite contradictory.

**Lifting**

This is the process whereby a child is routinely lifted out of bed and brought to the bathroom to void during the night. The idea is that the children will eventually learn to wake themselves and use the bathroom, thus avoiding accidents. The method has been in use for many years, however, there have been no conclusive trials showing supportive results and its use is fraught with compliance issues from both parents and children alike. While lifting and use of trainers are a pragmatic approach by parents, they should be discouraged as they do not help the child get any nearer to being dry as the child is voiding when they have no sensation of the need to void, and trainers reduce the feeling of wetness and are also permissive in reducing motivation in the child to improve.

**Enuresis alarms**

First described in 1938, the use of conditioned treatment with stimulation by alarm after voiding is still seen to be a useful method in the management of enuresis. The concept is that the child learns, through repetitive disturbance by an alarm which is set to recognise moisture, to either finish voiding in the bathroom or to inhibit the voiding reflex itself. It is a technique that requires a very well-motivated child and family, as significant disturbance to sleep can be expected initially. In general, the child becomes conditioned to respond more quickly to the alarm and thus episodes of enuresis decrease in frequency. Studies have shown that alarms take between 12 to 16 weeks before there is treatment success (generally measured as three to four weeks without an episode of enuresis). A 30% failure of treatment due to non-compliance has also been shown. A Cochrane systematic review in 2005 showed a success rate of 66% with an increased likelihood of success if the alarm pad was used beyond the treatment period. Treatment with an alarm requires nightly commitment and a stable 12 to 16 week period to work.

**Pharmacological management**

**Desmopressin**

Desmopressin or DDAVP is a synthetic ADH analogue used to artificially induce a reduction in urine output during the night. The anti-diuretic hormone is usually released from the posterior pituitary in a circadian pattern, thus in the mature system, causing a reduction in urine output overnight by conserving water and concentrating the urine. In young children, this system is immature, and early studies did show reduced nocturnal levels of ADH in children with enuresis versus normal controls. Trials with synthetic ADH have given variable results with most children responding, others only partially, and some not at all. Desmopressin, therefore, does provide effective treatment for the majority of children, with many studies reporting up to 50% cure rates and a 70% improvement in symptoms. The problem with this treatment is that its relapse rate once treatment is stopped is very high at 60 to 70%. Due to its immediate effect, DDAVP can be used intermittently to help with continence at important times (i.e. sleepovers, camping trips, etc.). No child with chronic hyponatraemia or a history of hyponatraemia should receive desmopressin as a treatment for enuresis.

Factors that have been identified that predict success with desmopressin include a normal bladder capacity, older age (over eight years old), less severe wetting and one episode of wetting per night.

**Tricyclic antidepressants – imipramine**

These drugs reduce the contractility of the bladder and have been used for the treatment of NE particularly in cases of dysfunctional voiding. We do not recommend these drugs be used due to the unacceptable risk of cardiac arrhythmias, poor response rate and high rate of relapse.

**Anticholinergic therapy**

If a child also has daytime urinary incontinence, it is reasonable to consider oxybutynin or tolteridine twice daily together with the addition of desmopressin at night, should there be no improvement in enuresis on anticholinergic treatment alone.

**Alternative therapies**

A Cochrane review of alternative therapies and their use in the treatment of nocturnal enuresis showed some evidence of efficacy with acupuncture and hypnosis versus sham treatment. The studies were small and the conclusion was that larger trials would be needed. The studies did not compare alternative therapy to pharmacotherapy.

**Summary**

Nocturnal enuresis is a very common problem of childhood. It is a diagnosis of exclusion and a thorough medical history and physical examination should be carried out to rule out a pathological cause before treatment options are tried.

The natural history of the condition is that it resolves spontaneously in the vast majority of children. Treatment should not be considered until the child is at least eight years old, unless there is significant stigma attached to the condition.

Preliminary methods such as motivational techniques, reducing night-time fluids and diary-keeping will result in an improvement in most children and should be tried for at least three months before further methods are used.

Alarm pads require a highly-motivated child and family, and long-term therapy may be required. The risk of relapse is very real.

Pharmacological therapy is largely limited to desmopressin oral therapy at present. It is highly efficacious and can be used intermittently, however it does not cause maturation of the continence process and the risk of relapse on cessation of treatment is as high as 70%.

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References on request