

CLINICAL CASE ROUNDS IN CHILD AND ADOLESCENT PSYCHIATRY

Enuresis and ADHD in Older Children and an Adolescent Treated with Stimulant Medication: A Case Series

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Abstract

Uncommonly, older children and adolescents can present with a history of enuresis. Resolution of enuresis followed the diagnosis and treatment of Attention Deficit Hyperactivity Disorder (ADHD) in each child in this case series. Subjects were three children with DSM-IV-TR ADHD, who presented with a history of primary nocturnal enuresis (PNE). Our results reveal that a subgroup of children with ADHD plus enuresis, when treated with stimulant medication, demonstrated resolution of enuresis as well as ADHD. These results suggest clinical implications for providers treating children and adolescents with enuresis and ADHD.

Background

Individuals in this case series presented with ADHD as a primary concern. The purpose of this case series was to identify the following hypothesis: children with ADHD and enuresis will have resolution of both disorders when treated with stimulant medication. We do not yet understand the relationship between the simultaneous resolution of both these disorders and stimulant medications.

Child psychiatrists treated children in this sample at the University Medical Center (UMC), a multispecialty clinic in which psychiatry is 1 of 7 specialties. UMC is not a tertiary care clinic, since greater than 50% of new patients have not been previously diagnosed or treated. Subjects were excluded from selection for this case series if they had any co-morbid psychiatric disorders or any major psychosocial stressors. Each of them met diagnostic criteria for current ADHD when clinically referred and had active symptoms of the disorder when they were receiving treatment. The children had no active medical problems, including no urinary complaints, no history of any abuse, no other medications, and had never achieved dryness. PNE was synonymous to mono-symptomatic enuresis, according to the International Children's Continence Society (ICCS) (Neveus, 2006).

Case Discussions

A 9-year-old female met criteria for ADHD, combined type. Enuresis occurred almost nightly. Extended release methylphenidate HCl (Concerta®) 54 mg daily was prescribed. Increased interest in completing homework occurred, resulting in academic improvement in all classes. Cessation of enuresis occurred immediately after initiating the stimulant.

An 11-year-old male presented for treatment at the request of his parents and met criteria for ADHD, inattentive type. He had been unresponsive to treatment for enuresis by another provider with Imipramine 50 mg daily. ADHD treatment was initiated with Atomoxetine HCl 40 mg daily and was titrated to 60 mg daily, according to his weight of 45.5 kg. Improvements in ADHD symptoms had been minimal after 1 month and enuresis persisted. Atomoxetine HCl was discontinued and extended release dexamethylphenidate HCl (Focalin XR®) 10 mg daily was prescribed. At 1-month follow up, he had experienced significant improvement in academic performance and confidence. On the days he had taken the stimulant, no enuresis occurred. However, enuresis did occur on the days when had not taken the stimulant medication.

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Submitted: February 16, 2010; Accepted: November 11, 2010

A 15-year-old male presented with difficulties in school and home and was diagnosed with ADHD. Enuresis occurred 3 to 5 times weekly. Extended release amphetamine-dextroamphetamine (Adderall XR®) 10 mg daily was prescribed. Behavior and academic performance improved significantly. Resolution of enuresis was noted immediately, after administration of the first dose.

Discussion

The relationship between enuresis and ADHD is complex. ADHD was strongly associated with enuresis in a large national sample (odds ratio, 2.88) (Shreeram, 2009). An increased risk for enuresis in children with ADHD was documented in a study of psychiatrically referred patients with ADHD (Biederman, 1995). However, the Biederman study did not involve the treatment of patients with stimulant medications. Findings from a retrospective study showed the presence of ADHD had a negative effect on the resolution of enuresis. Of those with ADHD, 68% had resolution of enuresis compared with 91% of controls (Crimmins, 2003). The incidence of enuresis declines with age (Furgesson, 1994). A third of all cases of enuresis are sporadic (von Gontard, 2001). The role of ADHD in the late resolution of enuresis is unknown. Research comparisons have been difficult due to lack of standardization of study designs and concise reporting of studies (Baeyens, 2005).

Etiology

Etiological factors for enuresis studied include factors related to sleep. Several authors noted connections between enuresis and sleep. A high sleep arousal threshold was noted in enuretic children (Neveus, 1998; Wolfish, 1999). Hunsballe (2000) found that EEG indicated increased depth of sleep in enuretics inadequately reflected by conventional EEG technique. Bader (2002) noted enuretic children had signs of short EEG arousal prior to enuresis. More recently, Safarinejad (2007) found that deep sleep was one of several factors contributing to enuresis. No sleep problems were noted resulting from the use of extended release medications in this series. Our results are consistent with Pelham (2001) who found no significant differences in sleep occurred with the use of three-time-daily methylphenidate. We propose that stimulants have their effects on enuresis by decreasing sleep arousal threshold and by allowing the enuretic child to awaken to prevent an enuretic episode.

Interestingly, associations between PNE and ADHD via decreased prepulse inhibition (PPI) of startle have been debated by several investigators (Baeyens, 2006; Baeyens, 2007; Ornitz, 1998; Elia, 2009). However, these studies

presented contradictory findings; each made differing hypotheses regarding the association of these factors. Baeyens (2006) reported that dopaminergic and noradrenergic aspects of prefrontal cortical functioning enhance the controlled resources. We favor the view that proposed that a decreased percent of PPI can be eliminated when a stimulant is introduced.

Analysis reveals complex genetic heterogeneity in enuresis most commonly explained via autosomal dominant mode with high penetrance (90%) (Hublin, 2003; von Gontard, 2001). Modes of transmission for enuresis and ADHD are not known, but genetic factors are recognized as having important roles in both disorders (Farone, 2005; 1998). Studies noted linkage for enuresis at 4 loci: chromosomes 8, 12, 13, and 22 (Arnell, 1997; Bayoumi et al., 2006; von Gontard, 1999). In a family study, Bailey (1999) showed similar rates of PNE in family members of subjects with ADHD and PNE, versus subjects with PNE without ADHD. Due to a common genetic risk, deficits in arousal may be a common trait that links enuresis and inattentive ADHD (Elia, 2009).

Investigators emphasized constipation as an under-recognized factor associated with enuresis (Cayan, 2001; Duel, 2003; Inan, 2008; McGrath, 2008; Moffatt, 1997; Robson, 2008). When constipation was treated, urinary incontinence resolved and urinary leakage improved (Humphreys, Reinberg, 2005). Constipation was not a factor in any of the children in this series.

The results of this case series must be considered in light of its limitations. Diagnostic instruments were not used. Additionally, information was gathered only from parents. We did not obtain collateral information from teachers or any other sources. This case series does not address the cause or effect of the contributing factors that are identified in relation to ADHD and enuresis.

Summary

Our case series results add to the existing literature of associations between ADHD and enuresis. No previous reports identify the resolution of both enuresis and ADHD after children were treated with stimulant medication. Associations between these two disorders include the consideration of multiple factors involving sleep, prepulse inhibition of startle, and genetic factors.

Clinicians should consider assessing children presenting with enuresis for ADHD and vice versa. Future research should include prospective studies assessing children with ADHD and enuresis to enhance our understanding of the relationship between the resolution of enuresis and ADHD after treatment

with stimulant medications. Research definitions for enuresis should conform to standards recommended by the ICCS, allowing for better comparison of studies (Neveus, 2006).

Acknowledgements / Conflicts of Interest

This work was supported by The University of Alabama's Research Grants Committee. The authors report no conflicts of interest.

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