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Elimination Disorders Associated with Excessive Media Use

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Abstract

Excessive digital media viewing and video game play can negatively impact children's development. We report a seven-year-old boy with enuresis and daytime encopresis without an organic etiology, which resolved with the cessation of digital device use. The excessive use of digital entertainment should be considered in children with enuresis and encopresis.

Introduction

The prevalence of digital media has saturated recent generations. On the surface, it appears no different than the scheduled television programs and games of the past. What has changed in the modern era is the enormous volumes of digital media content available and the mobility of electronic devices. Mobile digital devices and online media provide a vast selection of entertainment content that can occupy a child's entire day. The Kaiser Foundation in 2010 estimated that children 8- to 18-years-old use digital media for entertainment an estimated 7h 38m daily. [1] Early and excessive exposure to digital media in children can be associated with negative consequences in their development, including problems with sleep, memory, attention, and language skills. [2-5] With the moderate use of video games in children (<1 hour daily), there are reported benefits to mental health. [6] However, the excessive use of video games can be associated with undesired and unhealthy behaviors. [7,8]

Early school age children may still exhibit nocturnal (nighttime) enuresis as a normal part of development. Diurnal (daytime) enuresis though is less common once children reach school age. Children may experience enuresis alone (monosymptomatic) or with associated symptoms such as urgency or incontinence (non-monosymptomatic). The causes of enuresis are numerous and are categorized into primary or secondary forms. In the absence of an organic or physiological cause for enuresis, children who suffer from persistent enuresis may have a loss of central control. [9] Encopresis is a relatively common childhood problem occurring in 5% - 10% of 5-year-olds and 3% - 5% in 10-year-olds. Encopresis as defined by the DSM-5 involves the repeated passing of feces into inappropriate places (e.g., clothing, floor), whether involuntary or intentional. [10] This disorder often has a devastating effect on the child's development because of guilt, shame, and rejection. Differential diagnoses should include chronic diarrhea, chronic

constipation, irritable bowel syndrome, and Hirschsprung Disease. [11] Encopresis and emotional problems often coexist among these children and may even appear to be causally related. However, most encopretic children are not emotionally disturbed and their families appear stable. [12]

This report presents a case of a seven-year-old boy who was treated in the ophthalmology clinic for visual amblyopia and accommodative esotropia. During the ophthalmology evaluation, the mother indicated concerns about unresolved non-monosymptomatic enuresis and encopresis. It was suspected that the daily use of six to eight hours of video games and watching online videos may be the cause of the boy's enuresis and encopresis. After complete removal of all entertainment digital media and video games for one month, both the enuresis and encopresis resolved. To our knowledge, this is the first medical case report of both enuresis and encopresis being associated with excessive use of video games and online streaming videos, which resolved within one month of complete abstinence from all digital media exposure.

Patient Presentation

After signed, informed consent from the mother and the child, this case was prepared for publication. The child was a seven-year-old boy with a history of accommodative esotropia and visual amblyopia in the right eye. The visual amblyopia was managed with eye patching, and the child's visual acuities were 20/25 in the right eye and 20/20 in the left eye. The child's only other medical diagnosis was allergic rhinitis, which was managed with nasal fluticasone and oral loratidine 10 mg daily. During a follow-up clinic visit with ophthalmology, the mother expressed concerns about the child's frequent daytime enuresis (few times daily), nocturnal enuresis (four times weekly), and daytime encopresis (three to four times weekly). Previous evaluations by his

pediatricians identified no organic cause for the enuresis and encopresis. The mother stated that the child used a personal tablet for six to eight hours a day since the age of three to play a popular online multiplayer game and to watch videos online. While playing video games and watching videos on the tablet, the mother reported that the child did not express being hungry and had little awareness of wetting or soiling his clothes. The mother suspected that video games and using the tablet for videos may have contributed to her child's problems. She started to cutback her son's use of the tablet for a few weeks. The ophthalmology team encouraged the mother to completely abstain from video games, streaming videos, and the use of the tablet.

One month later, the non-monosymptomatic enuresis and encopresis resolved. The child did not have any wetting or soiling accidents. One year later, the mother reports restricting the child to one hour of video games weekly, played on Saturdays only. During the eleven months after implementing the restriction on video games, the child had only two daytime enuresis episodes and no nighttime accidents. The enuresis and encopresis have remained resolved without pharmacotherapy, diet modifications, or other interventions besides limiting screen time. The mother reported that the child expressed more interest in reading, played outside more, improved his handwriting skills, and showed increased enjoyment in doing school work.

Discussion

Lower prepulse inhibition through impaired sensori-motor gating has been proposed as an etiology for non-monosymptomatic enuresis in children concentrating on digital media and provides a neurophysiologic correlate for wetting while playing and concentrating on videos. [13] Similarly, we believe this boy's non-monosymptomatic enuresis may have been due to a lower prepulse inhibition associated with increased concentration during his prolonged six to eight

hours of play on the tablet. Support for this was observed in the rapid resolution of enuresis after one month of removing all entertainment digital media. With complete abstinence from digital media and gaming, nocturnal enuresis and encopresis also resolved, presumably because the child was more aware of the physiological urgencies associated with the need to urinate and defecate. Interestingly, media use has been reported to disrupt sleep patterns in children. [5] Additional research is needed to determine if there is an association between excessive, prolonged digital media use and nighttime enuresis and if this relates to sleep disruption in children.

Another possible mechanism for the child's lack of awareness of the need to urinate and defecate may have been due to the pain reduction effects of video games. Video games have been used during debridement of burn wounds in pediatric patients during hydrotherapy. [14] In addition, we reported a case where lack of pain while playing video games on a cell phone resulted in the tendon rupture of the thumb. [15] Further studies are needed to determine if the pain reduction properties of video games may lead to developmental delay, lack of body awareness, and poor control of urination and defecation in children.

Furthermore, video games and digital media have been shown to cause physiologic and mental stress in children, with the subsequent release of cortisol and other neuroendocrine hormones. The pleasure and excitement associated with video game playing involve physiological arousal and stimulation of the hypothalamus-pituitary-adrenal (HPA) axis. [16,17] Children and adolescents playing video games exhibit increases in heart rate, blood pressure, sympathetic tone, plasma norepinephrine, and food intake. [16,17] Most of the arousal associated with video games are mediated by visual cues. With increasing immersive, social, and challenging properties in video games and digital media content, children are easily captivated

by modern digital media and video games. [18] The prolonged and excessive attention to digital media and video games may be associated with developmental and self-control issues in children. There is research linking media exposure in children to an increased risk of attention-deficit/hypersensitivity disorder and the development of virtual autism. [3,19] Studies found a dose-dependent relationship of screen time and autistic-like symptoms in children, such as delayed language development and impaired social interactions. With screen removal, these symptoms quickly regressed similarly to the case we presented. [19]

Moreover, there may also be reductions in executive function. [4] An aspect of executive function that could be pertinent to our patient is inhibitory control, or the ability to ignore distractions. Modern games are designed to keep the player's attention. While this may not appear to present the same problems for the developed brains in most adults as it does in less developed brains, it could be an underlying cause of why this child ignored his sense of interoception and continued to play until urination and defecation.

As for the caregivers of enuretic and encopretic children, the failure to achieve dryness can be frustrating and pose negative psychosocial consequences such as poor self-esteem, poor sense of mastery, depression, and acting-out. These adults spend more time, money, and effort related to cleaning and replacing linens and clothes, sometimes even frequently waking up the child during the night to prevent bedwetting. [20,21] Additionally, caregivers might view their child's enuresis as a parenting failure or an intentional act. [20] This could lead to reduced positive parent-child interactions and depression in the family. [21] For active-duty families, as in our case, stress at home threatens military readiness. As a result, physicians in the primary care setting should be aware of the negative implications of increased screen time in enuretic and/or encopretic children to prevent delayed diagnosis. Early identification from a thorough history

could save families multiple visits to the physician and allow service members to stay focused on the mission.

Before ceasing the online video games and video streaming, our patient reported to have little desire to eat and no awareness of wetting or soiling himself while playing on the tablet. After one month of abstinence from digital media and video game use, the non-monosymptomatic enuresis and encopresis resolved. The patient's mother reported the child improved both written and spoken language and improved his grades at school. In this case, it is remarkable how quickly non-monosymptomatic enuresis and encopresis resolved after the removal of digital media and video games. It is also worthy to note the behavioral and academic improvements when exposures to digital media and video games were restricted in this child. There is still considerable research to be conducted on how digital media and video games affect developing brains. More research is also needed to determine the prevalence of behavioral and health problems associated with excessive digital media and video game exposure in children. This case is important for healthcare providers working with children because it demonstrates the importance of asking about digital media usage and gaming when evaluating enuresis and encopresis in children.

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