Nocturnal Enuresis and Chiropractic Treatments

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Abstract

Nocturnal Enuresis is a condition that is not uncommon for young children to suffer with. If the child does not outgrow the condition many psychological effects can occur. Multiple forms of enuresis affect children, the most common being monosynaptic enuresis. This paper reviews the different types of nocturnal enuresis, physiology and innervations of the bladder, and muscles associated with the micturition process. This paper also reviews various literatures, including mostly case studies, which documents use of chiropractic as a form of treatment for nocturnal enuresis. Though additional research needs to be done to further document the effectiveness of chiropractic as a method of treatment for this condition, the case studies and series provide some background information and a stepping stone for more clinical trials to be done.

Introduction

Nocturnal enuresis is one of the most common problems in the pediatric population. It is estimated that between five to seven million children suffer from bed wetting, and is known to affect more males than females. Males are estimated be three times more likely to wet the bed in comparison to females of their same age.[1] Enuresis refers to uncontrolled voiding of the bladder.[2] Nocturnal enuresis refers to uncontrolled voiding while sleeping. There are two types of enuresis, monosynaptic and non-monsynaptic. Monosynaptic enuresis describes a child who involuntarily voids but has no past history of urinary tract infections or bladder dysfunctions. This presentation is the most common form of nocturnal enuresis. Non-monsynaptic enuresis describes a child with lower urinary tract signs and symptoms such as a decrease in urine flow, increased urgency to void, or changes in voiding frequency. The non-monosynaptic form is more common with diurnal enuresis, which refers to involuntary voiding during the daytime. Diurnal enuresis can also be caused by monosynaptic enuresis, but it is more commonly associated with non-monosynaptic.[3]

Nocturnal enuresis is defined by the World Health Organization for a child under the age of seven as bed wetting twice per month, or once per month for a child over the age of seven. The American Psychiatric Association defines nocturnal enuresis in children six years or older who wet the bed two to three times per week for at least three consecutive months. There are two different types of nocturnal enuresis, primary and secondary. When a child suffers from primary enuresis it means they never experience more than six consecutive months completely free of bed wetting. These children have been dealing with this issue their whole life without insidious onset. Factors that may affect or exacerbate this problem include family disposition, small bladder capacity, increased nocturnal urine production, deep sleeping, constipation, and

several other conditions. In children with nocturnal enuresis the primary form is more common than secondary. A child is considered to have secondary nocturnal enuresis when they begin wetting the bed after they have been dry in the night for over six months. This can initiate from a psychological stressor or major event in the child's life. [4]

There are different treatment options for nocturnal enuresis, but it is most commonly a self limiting problem and treated as such. The natural regression rate of the condition is 13% per year. Most children outgrow nocturnal enuresis, however if it continues into adulthood, it is likely to continue throughout their lifetime.[5] Research shows that at five years of age 20% of children have nocturnal enuresis and by the age of six the percentage drops to between 10 to 15%. By the age of ten the percentage further declines to 5% of the pediatric population.[1] Treatments include alarm systems to wake the children during the night, award programs to reward them for dry nights, pharmaceutical drugs to alter ADH levels, acupuncture, and chiropractic adjustments as well as other therapies. [5]

The purpose of this paper is to discuss the different types of nocturnal enuresis and expose the reader to the variations of this condition. The paper also discusses the effectiveness of different chiropractic treatments that have been used to help with this condition. There is a wide variety of philosophies relating to chiropractic adjustments and treatments; however each adjustment is focused to increase the function of the surrounding nerves and tissues, regardless of the philosophy behind it.

Discussion

Most children that suffer from nocturnal enuresis do not have problems with involuntary voiding during the day time and primarily have issues only at night. Children go to

the bathroom between five and nine times per day and the body must change its physiologic activity at night so not to produce as much urine. This makes it easier for the child to store urine in their bladder because a decreased amount is produced. This is also true with adults. Dysfunction in any of these systems can result in nocturnal enuresis. There are many factors that can cause this. One of these factors is that the child may be a deep sleeper and does not respond to the normal arousal response. Reflexes within the bladder should awaken the child and alert them that the bladder is full. If these reflexes do not work properly, involuntary urination can occur. This can result from problems within the pontine micturition center in the brain stem, as well as the Locus Coeruleus which is responsible for sleep arousal. Nocturnal enuresis may also occur because of decreased levels of ADH production at night. The low levels of ADH cause the bladder to fill up faster, making it harder for the child not to urinate because their bladder is full. Lastly, neuronal responses may not be working at their maximal potential to properly activate the bladder and internal and external sphincters during appropriate times. These problems could be in the sympathetic, parasympathetic or somatic nervous system, or within the pontine micturition center in the brain.[2]

There have been multiple theories on what causes nocturnal enuresis as stated above. They range from the person not awakening from a deep sleep, altered bladder function, increase in urine production at night, or even a mixture of the three. However, a study showed that enuretic patients lacked the normal diuretic hormone levels at night which lead them to produce large amounts of urine.[6] Other research shows that children can involuntarily void during the night due to either excessive nocturnal urine production or because of hyperactivity

of the detrusor muscle. Regardless of the cause, in both cases children fail to wake up by the natural body cues.[7]

There are two phases that occur in a properly functioning bladder. First is a filling phase in which the bladder begins to fill and the internal urethral sphincter remains closed. The parasympathetic nervous system must remain quiet during this time in order for the bladder to fill and no contractions to occur. The sympathetic nervous system is the main controller during this time and acts to quiet down the parasympathetic response, allow for relaxation of the bladder detrusor muscle, and allow for the contraction of the internal urethral sphincter. The pudendal nerve is also excited during the filling phase. The sympathetic neurons originate from T9 to L1 spinal levels, travel via the sympathetic chain and act to inhibit the detrusor muscle. The pudendal nerve originates from somatic neurons from S2 to S4. When the bladder begins to fill, the pudendal nerve is activated which in turn acts to keep the external urethral sphincter closed. This ensures there is no leakage of urine out of the bladder due to both sphincters being closed which is made to act as a fail-safe mechanism.[8]

The second phase is the emptying phase which can happen either voluntarily or involuntarily. During involuntary voiding the bladder expands and activates stretch receptors which in turn activate the sacral cord. This tells the body that the bladder is ready to empty and the body prepares to do so. At this time the pudendal nerve is also signaling the pelvic floor muscles to relax. This is done by inhibitory processes on the somatic nerves from the descending fibers from the micturition center in the pons which allow the external sphincter to relax and open up. The parasympathetic nerves at this time are also signaling the detrusor muscle to contract. The parasympathetic neurons originate from S2 to S4 to form the pelvic

splanchnic nerves which travel to the detrusor muscles for an excitatory effect. This whole process allows for voiding of the urine. [8]

In infants this pathway in the brain is not developed which is why it is unpredictable when they will urinate. The brain center that controls urination is in the cerebrum and the pontine micturition center (PMC). The brain takes over the primitive voiding reflex around ages three and four. A person can then control when to urinate and they are able to wait until an appropriate time to do so which allows their brain to override signals from their body.[8]

As stated above another cause of nocturnal enuresis is due to low levels of ADH (anti-diuretic hormone) at night which causes the bladder to fill up faster. ADH is made in the hypothalamus and released from the posterior pituitary into the bloodstream where it affects blood volume levels directly through water retention as well as blood pressure via vasoconstriction of the blood vessels. The more water that is stored by the body, the less urine produced. ADH aka vasopressin is used to conserve water in the body which in turn decreases urine production. The levels at night should be higher which allows the body to decrease urine production, and lower during the day so urine production can be higher and a person can voluntary void in a bathroom. If ADH levels are low in the night time more urine is produced and children may not wake up to their body's natural cues to go to the bathroom.[9]

If there is dysfunction within the nervous especially within the lower thoracic and upper lumbar region where the sympathetic neurons emerge from or in the sacral nerve roots where the parasympathetic and somatic nerves originate, chiropractic adjustments can greatly affect the neurological functions in a positive way.[8]

When looking into the literature of chiropractic treatments and nocturnal enuresis there were different types of articles to be found. The studies within the literature appear to have mixed findings and all did not come one conclusive response or perfect treatment. The Cochrane Review searched the literature from 1984 to 2004 and came up with the conclusion that chiropractic adjustments had better results than sham adjustments, however more research needs to be done. This is due to the simple fact that most of the research currently is case studies and only a few clinical trials dealing with this condition have been done. Not enough evidence supports that chiropractic can effectively treat nocturnal enuresis, however there are case studies that have been reported chiropractic as an effective treatment. [10]

There was a controlled clinical trial that consisted of ten weeks of treatment and two weeks of non-treatment with 46 children. The treatment consisted of a chiropractic adjustment or a sham adjustment. The chiropractic adjusting was performed with technique called the Palmer Package which is high velocity, short lever adjustment. The sham adjustment was done using an Activator on a nontension setting. After the treatment was done the treatment group had a decrease in wet nights by 1.5 nights over a two week period with the pretreatment frequency being 9.1 nights and the post treatment being 7.6 nights. Also 25% of the children in the treatment group had a decrease in the number of wet nights by 50%. The control group had no change in the frequency of wet nights.[11]

Another controlled clinical trial was performed with osteopathic adjustments. This study had ten children who were split into two groups depending on if they had diurnal or nocturnal incontinence. The patients either received medical treatment, which was the control group, or osteopathic treatment. The osteopathic group was treated five times over a twelve

week period. The conclusions from this study were that both medical and osteopathic treatments worked, however the osteopathic treatment led to more longer lasting results. If the children were taken off their medications their enuresis would come back. The children treated with osteopathy and manual adjustments had long term results.[2]

A case series was done with 33 patients that suffered from nocturnal enuresis with ages ranging from 3 to 18. The researchers said that in ten of the patients their constipation played a role in their nocturnal enuresis. The patients were treated with NeuroImpulse Protocol (NPI), which is a form of chiropractic adjusting technique. There was follow up with the patients over a 12 month period. At the end of 12 months 22 of the 33 patients had complete resolution of bedwetting, and the mean number of treatments for each person to see a favorable response was two. The study revealed that when a child has constipation and nocturnal enuresis, it is crucial to resolve the constipation in order to make improvements with bedwetting. They also stated that if there is a family history of bed wetting as well as constipation in the child, the condition is much harder to resolve.[1]

Another case series was performed using the Pro-Adjustor on patients, which is another type of chiropractic treatment. This study however was performed on the elderly with urinary incontinence at night. Even though this was not performed in children the basic mechanism of urinary incontinence is similar, but the elderly were waking up to go to the bathroom unlike children. These patients were treated one to five times with the Pro-Adjustor and there was a decrease in how many times they went to the bathroom by almost two to three visits. The average nightly bathroom visit before treatment was between three and four, and post treatment was once a night. Most reported a decrease within two visits. Even though this is

not a direct study of children and nocturnal enuresis, it does show the effectiveness of chiropractic treatments and decreased urinary output within the night.[12]

There were seven case studies that looked at children with nocturnal enuresis and chiropractic treatments. They all responded favorably to the treatments, but each took different amounts of times to see results. One case study was of a four year old who had severe allergies along with nocturnal enuresis. The treatment consisted of 32 weeks of SacroOccipital Technique (SOT) treatments which included of spinal and cranial adjustments. After the 32 weeks the child's bedwetting had resolved and all of the asthma symptoms had cleared up.[5] Another case study was of a five year old boy with who had both urinary and bowel incontinence. He also had a surgical correction for a lumbar meningocele, spinal lipoma and tethered spinal cord. The child had five Activator treatments in the lumbar spine and sacrum over a course of four weeks. Short wave diathermy was also performed over the lumbar and sacral regions. After the chiropractic treatments he was able to control his bowel and bladder for six months. There was regression in his signs and symptoms after six months where he was treated again and a second round of treatment took four weeks to complete which was the exact same chiropractic treatment as before. The second treatment allowed him to be able to control his bowel and bladder again.[13]

There was a case study of an eight year old boy with a history of asthma and primary functional nocturnal enuresis. He had many areas of lumbar segmental dysfunction between the lumbar vertebrae, and after one chiropractic adjustment to the lumbar area the child had complete resolution of his enuresis. Later on the little boy had an injury to his back which caused the nocturnal enuresis to come back. After lumbar chiropractic adjustments the

nocturnal enuresis was resolved.[14] Another case study was of an eleven year old boy with a history of nocturnal enuresis. Chiropractic subluxations were found at C2, C6, T1, T5, T12, L3, L5 as well as in the pelvis. He was adjusted with an Activator and at the end of the treatment plan, the mother reported a significant decrease in the nights he was wetting the bed. There were no numbers reported, but instead it was what the mother perceived as a significant decrease in wet nights.[15]

Another article focused briefly on two cases studies. One was of a four year old female who suffered from nocturnal enuresis each night. Chiropractic subluxations were found in the cervical region, T3, T5, sacrum and ileum. After having one chiropractic adjustment in the subluxated areas, her mother reported that she had her first dry night. Another case study in the same article focused on a five year old male who suffered from bedwetting each night. There were chiropractic subluxations found in the cervical and thoracic spine and also in his sacrum and ileum. Just after the initial adjustment the mother reported that the boy had improvement in his bed wetting. After a total of ten adjustments, the nocturnal enuresis was completely resolved. [16]

The last case study found was about a six year old boy who suffered from nightly bed wetting, ADD, and toe walking. Chiropractic subluxations were found at the occiput, atlas, sacrum and pelvis. After four weeks of chiropractic treatment his bedwetting only occurred two or three times per week and he had significant improvements in his toe walking.[17]

Even though most of the literature supports chiropractic as an effective way to manage and even treat nocturnal enuresis, there is not enough solid literature to support it. An article that reviewed the literature from 1989 to 1993 found that chiropractic adjustments had similar

effects on the resolution of nocturnal enuresis as the natural progressive of the condition.[18] Another article found similar results stating that the natural resolution of nocturnal enuresis was very similar to that of chiropractic adjustments. Both articles point out the lack of control groups in all the different types of studies involving the effectiveness of chiropractic and nocturnal enuresis.[19]

Chiropractic still has to be evaluated even more with research and clinical trials instead of just having only case studies to prove its effectiveness. The medical community has much more research on other forms of treatment which include alarm systems, psychotherapy, reward systems for dry nights, acupuncture, and medication such as desmopressin to help decrease the urine production at night. Chiropractic is one of the least invasive treatments that can be used for this problem and has no physical or psychological effects on the child. The more research that is done, the more the medical and chiropractic field will grow to understand the effectiveness and the physiology behind chiropractic adjusting and nocturnal enuresis.[20]

Conclusion

Nocturnal enuresis can be a very complicated problem depending on the type of enuresis the child has. There can be psychological reasons the child is having problems with bedwetting as well as physiological reasons why they are too. It is a devastating problem to children as they get older for social reasons and hard on the family to deal with the issue and come up with a solution. The research on this topic and the treatment of chiropractic care is limited and most data the field has is from case studies. This limits support on the topic until more trials and studies are done with control groups to prove or disprove its effectiveness. The studies also need to be more detailed and fully describe each adjustment and how and where

on the body it was performed. The focus should start in the lower thoracic and upper lumbar spine as well as the sacrum. All of these areas are where the spinal nerves exit to innervate the bladder the muscles that are involved in urinating.

There is more room for growth within the field to do studies on all the different chiropractic techniques and how effective they each are. For example there could be studies using manual adjustments such as Diversified and Thompson. There can also be studies from ART looking at the different muscles surrounding the urinary system, especially releasing the psoas muscle. Other light force techniques such as SOT, CMRT and Applied Kinesiology need to also be studied on this topic because they do more work that directly relates and affects the organs.

The research in the future should be able to provide data that chiropractic should be used as an initial care of treatment or in conjunction with other treatments to get the maximal effect for the patients suffering this problem. Conservative care should be the first step and even though it may not always work on everyone it is a cost effect approach that only improves physiological function and help children achieve dry nights for the first time in their lives.

References

1. Van Poecke, A., Cunliffe C. Chiropractic Treatment for Primary Nocturnal Enuresis: A Case Series of 33 Consecutive Patients. J Manipulative Physio Ther. 2009 Jan 21; 32(8): 675-681.
2. Kargl D. Osteopathy with Enuresis [thesis]. Vienna (Austria): International School of Osteopathy. 2008 Nov.
3. Enuresis. Joel Schwab MD. [cited 2012 March 9] Available from http://pedclerk.bsd.uchicago.edu/enuresis.html.
4. Thiedke CC. Nocturnal Enuresis. Am Fam Physician. 2003 Apr 1;67(7):1499-506.
5. Postles A, Taylor H, Holt K. Changes in Asthma Symptoms and Bedwetting in a Four Year Old Child Receiving Chiropractic Care: A Case Report. Chiropractic Journal of Australia. 2010 March. 40(1).
6. Nørgaard JP, Djurhuus JC. The pathophysiology of enuresis in children and young adults. Clin Pediat. 1993 Jul; Spec No:5-9.
7. Nevéus T, Läckgren G, Tuvemo T, Hetta J, Hjälmås K, Stenberg A. Enuresis—Background and Treatment. Scand J Urol Nephrol Suppl. 2000;(206):1-44.
8. Cramer G, Darby S. Basic and Clinical Anatomy of the Spine, Spinal Cord, and ANS. 2nd ed. St. Louis. Mosby; 2005.
9. Alon U. Nocturnal Enuresis. Pediatric Nephrology. 1995; 9(1):94-103.
10. Glazener CM, Evans JH, Cheuk DK. Complementary and miscellaneous interventions for nocturnal enuresis in children. Cochrane Database Syst Rev. 2005 Apr 18; (2): CD005230.
11. WR, Beavers S., Reddy SK, Kern G: Chiropractic management of nocturnal enuresis. Reed, J Manipulative Physiol Ther. 1994, 17(9):596-600.
12. Zhang J, Haselden P, Tepe R. A case series of reduced urinary incontinence in elderly patients following chiropractic manipulation. Journal of Chiropractic Medicine. 16 June 2006; 5(3):88-91.
13. Kamrath, K. Chiropractic management of a 5-year-old boy with urinary and bowel incontinence. Journal of Chiropractic Medicine. March 2010; 9:28-31.
14. Blomerth PR. Functional nocturnal enuresis. J Manipulative Physio Ther. 1994;17(5): 335-338.
15. Rodnick A, Rodnick P. Resolution of Childhood Nocturnal Enuresis Following Subluxation-Based Chiropractic Care: A Retrospective Case Report. Journal of Pediatric, Maternal & Family Health. 2010; 4:159-162.
16. Hough, DW. Case management of nocturnal enuresis. Today's Chiropractic. 2001 July/Aug. 59-66.
17. Crystal R. ADD, Enuresis, Toe Walking. Internat Chiropractic Pediatric Association Newsletter. 1997 May/June.
18. Kreitz BG, Aker PD. Nocturnal Enuresis: treatment implications for the chiropractor. J Manipulative Physio Ther. 1994; 17(7):465-473.
19. Leboeuf C, Brown P, Herman A, Leembruggen K, Walton D, Crisp TC. Chiropractic care of children with nocturnal enuresis: a prospective outcome study. J Manipulative Physio Ther. 1991, 14(2): 110-115.

20. Stude DE, Bergmann TF, Finer BA. A conservative approach for a patient with traumatically induced urinary incontinence. J Manipulative Physio Ther. 1998 Jun;21(5):363-7.
21. Gotlib A, Rupert R: Chiropractic manipulation in pediatric health conditions- an updated systematic review. Chiropractic and Osteopathy. 1998 June; 21(5): 363-7.