

Positive chiropractic treatment outcome of migraine without aura in a 6-year-old presenting with sleep bruxism and chronic sinus congestion: a case-report

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ABSTRACT

Migraine is a common disorder affecting up to 10% of children which can interfere with school attendance, academic and sport performances.^{1,2} The proposed pathophysiology has evolved from one purely vascular in origin to perhaps a neuro-inflammatory etiology.^{3,4} Clinical evaluation is the mainstay of diagnosis and should include family history, sleep habits and environmental triggers.^{5,6,7} Spinal manipulation of the cervical spine in adults and teenagers has shown similar effectiveness as prophylactic medications.^{8,9} A Canada-wide survey revealed that 7% of chiropractic pediatric patients presented for headaches.¹⁰ Unfortunately, there is no substantial data at this point to support the benefit of spinal manipulation in the pediatric sufferers of migraine.^{11,12,13} Recent research found a link between sleep parasomnia (bruxism), colic and migraine sufferers.^{7,14,15,16} To achieve a precise diagnosis, clinicians must refer to the latest diagnostic criteria to differentiate true migraines from tension headaches, sinus headaches or other organic causes.¹⁷ This case report discusses the chiropractic treatment outcome of a 6-year-old female patient suffering from migraine without aura, sleep bruxism and chronic sinus congestion. The patient was treated with mechanical assisted and manual manipulation techniques, massage and sinus lymphatic drainage. After 4 visits migraine intensity reduced from a 5/10 to a 2/10 and the frequency of headaches were reduced from 3 times per week to once a week without the use of medication. After 6 weeks of care, patient symptoms were significantly reduced but the treatment plan was not completed because the family relocated and continued travel to the office was prohibitive. After 17 weeks, the patient relapsed and 3 weeks later, they resumed care with progressive improvement of the child's well-being once we eliminated migraine triggers such as sun exposure, incorporation of resting periods with naps in the afternoon and cardiac coherence training exercises before bedtime.^{1,5,7,18,19} This case report highlights the need for high quality research on the effect of spinal manipulation in the treatment of pediatric migraine to provide a potential alternative option to the traditional medical treatment of migraine. This case also opens the discussion on the benefits cervical manipulations and cranial work may potentially have on sinus drainage and immune system response in autonomic conditions like sinus congestion.

Keywords: Migraine, children, spinal manipulation, bruxism, sinusitis

Introduction

Following tension headache, migraine is the second most common cause of chronic recurrent headache in school children with a prevalence ranging from 3.2 to 14.5%.¹⁴ Pediatric migraine differs from adult migraine in that they are typically of shorter duration and bilateral in children.³ Di-

agnostic criteria are based on the international classification of headache disorders 3rd edition (ICHD-3 beta) from the international headache society (Table 1).²⁰

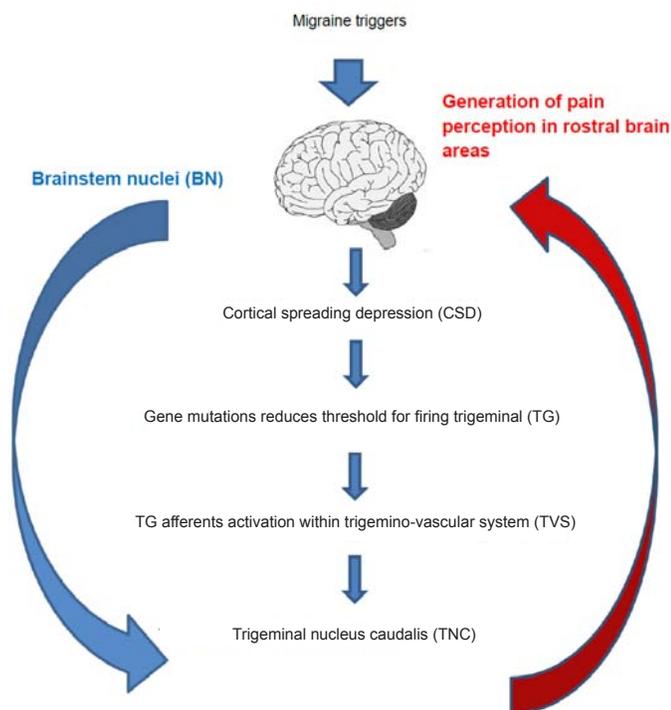
Migraine is divided into six major categories, the two most important of which are migraine without aura and mi-

Table 1: International headache society diagnostic criteria for pediatric migraine without aura^{3,14,20}

- A) A minimum of 5 attacks fulfilling features B to D
- B) Headache attack lasting from 2 to 72 hours
- C) Headache has at least 2 of the following 4 features:
 - (1) Unilateral (frontal/temporal) location commonly bilateral in young children
 - (2) Pulsating quality
 - (3) Moderate to severe pain intensity
 - (4) Aggravated by or causing avoidance of routine physical activity
- D) During the headache at least one of the following:
 - (1) Nausea and/or vomiting
 - (2) Photophobia and phonophobia (may be inferred from their behavior)
- E) Not attributed to another disorder

graine with aura.³ According to the literature, children with migraine have a genetic predisposition in some way activated by an environmental or physiological stimulus such as exposure to drugs, diet, stress or puberty.^{3,6} The pathophysiology of migraine in children is not perfectly understood due to a dearth of research in the field.¹¹ Recent studies using PET, intracarotid SPECT (single-photon emission computed tomography), MRA (magnetic resonance angiography), functional MRI and TMS (transcranial magnetic stimulation) concluded that the pathogenesis of migraine attacks is explained by a combination of vascular and neurogenic events. It has been proposed that the activation of central cortical and brainstem pathways in parallel with the peripheral trigeminovascular system results in a release of neuropeptides such as CGRP (calcitonin gene-related peptide) and substance P inducing vasodilation and neurogenic inflammation.^{14,21,22,23} (Figure 1).

Figure 1: Migraine pain generation* ^{14,21,22,23}



*Migraine triggers initiate the neuronal excitation that leads to clinical manifestation in children with a genetic vulnerability to migraine. CSD triggers plasma protein extravasation from cerebral blood vessels, which in turn activates TG afferents within TVS. Gene mutations could reduce the threshold for firing TG neurons. Signals are transduced to the TNC, which receives modulatory inputs from other BN. The TNC projects to rostral brain areas, where the perception of pain is generated.

Cranial autonomic symptoms such as nasal congestion are frequently found in pediatric migraine, often leading to a misdiagnosis of sinus headache, subsequently delaying appropriate migraine treatment.^{17,24} Recent research

found links between sleep parasomnia (bruxism), colic and pediatric migraine sufferers.^{7,14,15,16} Few older randomized control trials (RCTs) and a more recent one presented by Tuchin suggests that chiropractic spinal manipulative therapy might be equally efficient as propranolol (beta blocker) and topiramate (anticonvulsant) in the prophylactic management of migraine.^{9,25,26,27} This case-report will discuss the chiropractic care of a 6-year-old female patient suffering from migraine without aura presenting with sleep bruxism and chronic sinus congestion.

METHOD

An online literature search was conducted using scientific journal databases; PubMed, Elsevier, Index to Chiropractic Literature and Google Scholar. Databases were searched from inception through October 2015 using the keywords: Migraine, children, spinal manipulation, bruxism and sinusitis. Publications utilized included systematic reviews, randomized controlled trials and case studies. Other articles and resources were used to provide background information.

CASE PRESENTATION

A 6-year-old Caucasian female patient presented with frequent migraines without aura for the past 6 months. The migraines were located in the frontal region bilaterally and occurred 3 times per week graded at a 5/10 on a visual analog pain scale. The patient described the migraine as a diffuse pounding sensation behind her forehead and she felt slightly nauseated. During the episodes the patient could usually continue most of her daily activities at the kindergarten with the exception of some physical activity that involved jumping. On occasion she had to miss school and did not attend her gym class. Parents have reported that the child often ground her teeth at night and although she dealt with chronic sinus congestion year round, it was more intense during the winter time. The patient's pediatrician recommended the use of ibuprofen when needed which alleviated the patient's symptoms. The patient was examined by her optometrist 4 months ago who ruled out any visual or ocular problem.

Medical history included mild colic around 2 to 3 months of age followed by chronic otitis media between 3 to 4 years of age. She received 5 rounds of antibiotics for the recurrent otitis media. At age 4, she developed recurrent sinus congestion, most intense during the winter season. Since the age of 5 she often suffered from constipation. The migraines started when she was 5 and a half and progressively became worse. Based on her intake form which includes a detailed description of typical breakfast, lunch and dinner, she has a balanced diet with home cook meals. Her parents denied attempting any food elimination diets and had not identified any specific food triggers. Sun exposure and fa-

tigue were described as common migraine triggers for their daughter. The patient rarely drank water and preferred juices. Both parents suffered from migraines at a younger age. Their home was a smoke-free and pet-free environment. Previous history of injury included a fall from her crib at 6 months of age, a recent fall while tobogganing, and a fall on her head later during the course of care. The patient was an active young female who enjoyed participating in ballet and soccer. Severe migraine episodes interfered with her participation in day camp and athletics. She would watch 1-2 hours of television per day and played on the Leap Pad 2-4 hours per week.

CLINICAL FINDINGS

Complete blood count (CBC), Glucose AC, TSH and Epstein-Barr antibodies (VCA IgG IF / EBNA IF) in addition to an eye exam were done 3 months after the beginning of the symptoms. Blood work and eye examination were unremarkable. Parents had been using a “Netty Pot” and administering “Avamys” nasal spray to clear sinus congestion when it was necessary. Ibuprofen was used 1-2 times per week on an as needed basis. On examination cervical passive and active range of motion (ROM) were within normal limits. Muscle tension was noted in the left sub-occipitals, temporalis, masseter and bilateral trapezius muscles. Lymph nodes palpation was sensitive in the posterior cervical chain bilaterally at the initial exam. Segmental dysfunctions palpated at C0-1, T1-2 and L1-2. The temporomandibular joint (TMJ) was palpated superior on the right side with ipsilateral joint restriction. Cranial bones analysis presented an inferior left sphenoid with increased muscle

tension at the frontal-temporal junction bilaterally. Postural analysis revealed a mild forward head carriage and bilateral excessive foot pronation. Gait, coordination, blood pressure and neurological testing was within normal limits.

DIAGNOSTIC AND ASSESMENT

The patient’s clinical presentation met the International Headache Society diagnostic criteria for migraine without aura (ICHD-III beta) (Table 2). The pulsating quality of the headache accompanied with nausea and the avoidance of physical activity led to a probable diagnosis of migraine rather than tension headache. According to Heyer and Pappetti, the PedMIDAS is the only instrument validated to assess migraine disability among school-aged children.^{28,29} This diagnostic tool presents questions to rate the impact of migraine on school performance and level of disability at home. The PedMIDAS score was rated at 4 (little to no disability) at the initial exam and 22 (mild disability) 17 weeks later while she was attending day camp 2 weeks after her 5th visit (Table 3).³⁰

Table 3: PedMIDAS grading scale³⁰

PedMIDAS Score Range	Disability Grade
0 to 10	Little to none
11 to 30	Mild
31 to 50	Moderate
Greater than 50	Severe

The analog pain scale was rated at a 5/10 at the initial exam to 8/10 as her symptoms relapse 17 weeks after the

Table 2 : Timeline

2009	Infantile colic
2012	Onset of chronic otitis media
2012-13	5 series of antibiotics for otitis media
2013	Onset of chronic sinus congestion
2013-15	Use of “Netty pot” and “Avamys” nasal spray to clear sinus Congestion
2014	Onset of migraines and recurrent constipation Complete eye exam, CBC, Glucose AC, TSH and Epstein-Barr antibodies (VCA IgG IF / EBNA IF)
03/2015	1st chiropractic consultation followed by 6 chiropractic adjustments in 2 months period
05/2015	Family moved to a new city an hour drive away
06/2015	Patient had 1 mild migraine per week for the past 2 months and less sinus congestion. She didn’t need to rely on medication. Preventive chiropractic care implemented at 1 visit per month.
07/2015	Return of migraines while attending day camp in their new city. Emergency check-up for intense migraines with abdominal pain present for the past 3 weeks. Elavil, naproxen and lax-a-day was prescribed with no improvement of the migraine symptoms.
08/2015	Chiropractic care was re-introduced at 1 visit per week for 1 month. Migraine episodes have reduced in intensity but are still present on a daily basis.
09/2015	Patient is on Naproxen and Elavil daily following doctor’s recommendation. Constipation is occasionally alleviated with lax-a-day. Patient receives chiropractic care every 2 weeks. Sinus congestion is well controlled with the use of the “Netty Pot” and parents have stop using the “Avamys” spray. Patient still grinds her teeth at night.
10/2015	Cardiac coherence training exercise was prescribed before bed time to promote relaxation. Patient rarely grinds her teeth at night. Patient doesn’t wake-up with migraine, mild headache starts later in the morning but does not interfere with school or sports performance. Patient doesn’t have any sinus congestion. Chiropractic care is maintained at 1 visit per 2 weeks.
11/2015	Patient was assessed by a neurologist who stopped Naproxen and Elavil. Medication should only be used during an acute episode. Patient has occasional mild headache, she performs well in school and athletics. Preventive chiropractic care implemented at 1 visit per month.

initiation of chiropractic care. The frontal location of the migraine was less suggestive of organic pathology, which is most commonly located in the occipital region.¹⁴ There were no red flags present suggestive of tumor, meningitis or infection. The prognosis for this patient was good given the family's strong genetic predisposition to migraine, mild disability level, early diagnosis of the condition and healthy lifestyle of the patient.

THERAPEUTIC INTERVENTION

The patient started chiropractic care 6 months after the initial onset of migraine symptoms. Treatment consisted of spinal manipulation at C0-1, T1-2 and L1-2 using Thompson's drop, Activator instrument and modified Diversified upper cervical adjusting techniques in addition to massage of the left sub-occipitals, temporalis, masseter and bilateral trapezius muscles. Gentle mobilization of the right TMJ, sinus lymphatic drainage and cranial technique to the sphenoid were also applied. The patient received 5 chiropractic treatments over 3 months. Chiropractic care was re-introduced 6 weeks after following the flare-up of migraine symptoms to a frequency of 1 visit per week for a month and 1 visit every 2 weeks for 2 months. No adverse reaction to chiropractic care was reported by the patient or parents during the course of care. In addition, the patient was recommended to perform daily neck stretching exercises, increase water intake to 4-6 glasses per day and reduce time watching television and playing with her Leap Pad. Parents were also advised to have their daughter go through skin prick testing as well as blood work IgG ELISA testing to identify any possible environmental or food allergies / sensitivity.³¹ At most recent follow-up this testing had not been performed. After 27 weeks of care (10th visit) the patient was instructed to do cardiac coherence training exercises (deep breathing) before bedtime to promote relaxation and restful sleep.^{1,19}

FOLLOW-UP AND OUTCOMES

During the first month of care the patient didn't take ibuprofen for migraine. The intensity of migraine dropped to a 2/10 on a visual analog pain scale and frequency reduced to 1 episode a week and no longer interfered with the patient's daily activity. The patient then had a relapse of her symptom 3 months after the beginning of chiropractic care which brought her to the hospital's emergency with a migraine rated at an 8/10 on a visual analog scale and accompanied with nausea and constipation. She was kept under observations for few hours and the attending prescribed Elavil, Naproxen and Lax-A-Day. The patient was dismissed from emergency and referred to a neurologist in the following 4 months. Three weeks after the relapse of her symptoms the patient's complaint was unrelieved by the medication and she resumed chiropractic care. The same treatment protocol was administrated to the patient at a frequency of 1 visit per week for a month then 1 visit every 2 weeks for

2 months. After 2 weeks of re-introducing chiropractic care the patient was still having migraines on a daily basis but they were reduced in intensity to a 4/10 and were alleviated with rest, reduced physical activity and sun exposure. Upon returning to school she reported only mild headache without pounding nature and she was able to fully participate in school and athletics. The parents also indicated that it was the first summer where she wasn't complaining of mild congestion after going to the pool or playing outside. The parents reported a significant reduction of bruxism at night and the patient reported feeling well rested when she woke up in the morning. The parents continued administering the "Netty Pot" preventatively. Consultation with the neurologist, shortly after the patient's 11th visit, revealed that the patient no longer needed Elavil and Naproxen on a daily basis and should only use the medication during acute episodes.

DISCUSSION

This case highlights other health conditions related to migraines and stresses the importance of a thorough intake and clinical examination. In order to achieve a precise diagnosis the clinician must refer to the International Headache Society diagnostic criteria for migraine ICHD-III beta and the PedMIDAS questionnaire.^{20,28,29} This latest diagnostic tool (PedMIDAS), is questionable in its accuracy when completed during the summer holidays since the first 3 questions are related to school performance.²⁸ Since the brainstem regulates vascular tone and nociceptive function in the body it is logical that upper cervical spinal manipulation could have a positive impact on migraines^{14,13,32,33} however there is little literature to demonstrate the effectiveness of spinal manipulation on pediatric migraine. Three out-dated RCT's on spinal manipulation and migraine were found in the literature review.^{9,26,27} A more recent RCT from Tuchin, Pollard and Bonello discussed the effectiveness of spinal manipulation in migraine patients ranging from 10 to 70 years of age.²⁵ 50% of the subjects of this study noticed a reduction in the intensity of the migraine episode. 80% of the participants reported stress as a major contributor of migraine. The research conclusion was that spinal manipulation can have a positive effect on stress related conditions like migraine. Only one case report from 2013 was found by Kuhn where functional neurology and spinal manipulation was applied in the management of a 15 year old boy with migraine and behavioral learning difficulties.³³ After 4 months of care the patient was no longer suffering from migraine, his vision improved and tics reduced significantly. This case report suggests that a brain-based model of care may be of value in the chiropractic treatment of migraine and in some non-musculoskeletal conditions. Todd and al. presented a review of literature in 2014 on adverse events due to manual therapies in infants and children.³⁴ There were 31 reported cases of injuries from various healthcare

providers (7 chiropractors, 1 medical practitioner, 1 osteopath, 2 physical therapists and 1 unknown practitioner), 12 presented with serious injuries where an underlying pre-existing pathology was identified. Three deaths were reported from a physical therapist, a craniosacral therapist and an unknown practitioner. The current literature outlined no deaths associated to chiropractic care following manual therapy. This review stresses the importance of thorough history, examination and imaging if necessary to rule-out any potential pathology and congenital anomaly before applying manual therapy. Spinal manipulation remains a non-invasive, low risk therapeutic approach with minimal side effect for pediatric migraine.

Limitations

In order to fully appreciate the long-term benefits of chiropractic care in children presenting with migraine a larger scope of observation should be used ranging from 2 to 5 years instead of 8 months. It is recognized that this a unique case that cannot be generalized to the entire pediatric population affected by migraines. While under 3 months of consistent chiropractic care, the patient experienced improvement in her symptoms. After a 6 week lapse in chiropractic care, symptoms returned and this time the patient was advised to take two types of medication, Elavil and Naproxen. After three weeks of medication without a reduction in symptoms, the patient resumed chiropractic care. Symptoms started to improve again and eventually the patient was able to reduce the medication. The cumulative effect of the medication and chiropractic care in the second scenario may be linked in relieving the symptoms. Whereas initially, chiropractic care was sufficient to reduce the symptoms.

Early identification of possible migraine triggers can greatly influence the course of treatment.⁶ This case report outlines the need for valid research on the effect of spinal manipulation in the treatment of pediatric migraine to provide an evidence-based treatment alternative to the traditional medical treatment. This case also opens the discussion on the benefits cervical manipulations and cranial work may potentially have on sinus drainage and immune system response in autonomic conditions like sinus congestion.

ACKNOWLEDGEMENT

Special thanks to Sharon Vallone DC, DICCP of KIDSPACE Adaptive Play and Wellness and Rosemary Dos Santos DC from Montreal for their support in the production of this manuscript.

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