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# CASE STUDY

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## Resolution of Chronic Migraines in a 15-Year-Old Male Following Chiropractic Care: A Case Report & Review of the Literature

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### ABSTRACT

**Objective:** To report on the positive health outcomes following chiropractic in a teenage male suffering from chronic migraines.

**Clinical Features:** The patient was a 15-year-old male presenting with a chief complaint of migraine headaches that began when he was three years of age.

**Interventions and Outcomes:** Kale Upper Cervical Specific Protocol was utilized to manage this case. On the first visit, the patient was placed in the knee-chest posture and following adjustment, the sharp pressure he was experiencing prior began to alleviate. Over the next 24-month period the patient had experienced only 5 migraine headaches. Prior to chiropractic care the patient was averaging migraines once every 3 weeks.

**Conclusion:** We described the successful care of a 15-year-old male suffering from chronic recurrent migraine headaches with successful outcomes. We encourage continued documentation in the care of similar patients to inform practice and research.

**Key Words:** *Chiropractic, vertebral subluxation, pediatrics, migraine, adjustment, spinal manipulation*

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Chronic and recurrent pain in children is very common. In a systematic review of the literature, King et al.<sup>1</sup> found that the prevalence of chronic recurrent pain in children varies widely with the following data: headaches: 8–83%; abdominal pain: 4–53%; back pain: 14–24%; musculoskeletal pain: 4–40%; multiple pains: 4–49%; other pains: 5–88%. The authors noted that the pain prevalence rates were generally higher in girls and increased with age for most pain types. Lower socioeconomic status was associated with higher pain prevalence, particularly for headaches.

Children with chronic pain have been found to be deficient in peer relationships and social functioning<sup>2</sup> and compromised quality of life.<sup>3</sup>

As indicated from the findings of King et al., headache is a prevalent chronic condition in children. Of interest in this case report are migraine headaches in children. According to Barnes<sup>4</sup>, migraine occurs in 3% to 10% of children and currently affects 50/1000 school-age children in the UK and an estimated 7.8 million children in the EU. In the United States, nearly 1 in 4 U.S. households includes someone with migraines. Twelve percent of the population – including children – suffers from migraines. Specifically, 18% of

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American women, 6% of men, and 10% of children experience migraines.

Approximately 10% of school-age children and 28% of adolescents (i.e., between 15-19 years of age) experience migraine headaches.<sup>5</sup> Migraine is a public health issue. Healthcare costs and costs associated with lost productivity associated with migraines have been estimated to be \$36 billion annually in the United States. Data from 2015 indicated that although costs for treatment were \$5.4 billion, sufferers spent over \$41 billion on treating their entire range of conditions.<sup>5</sup>

In the interest of informing practice and research, we describe the successful chiropractic care of an adolescent suffering from chronic, recurrent migraine headaches.

## Case Narrative

### History

The patient was a 15-year-old male presenting with his parent for chiropractic consultation and possible care with a chief complaint of migraine headaches. The history revealed that at the age of 3 years the patient was involved in a motor vehicle collision. Shortly thereafter the patient began to experience visual disturbances which included seeing “halos.” At other times, the patient described that objects would appear very small or distorted. Out of concern, the patient’s mother consulted a neurologist with the eventual diagnosis of “migraine activity.”

No medication was prescribed to address the patient’s “migraine activity” with the advice to identify and avoid migraine triggers. Care in the way of self-medication was admitted by the patient and his mother. Ibuprofen and rest were instituted when the patient experienced the migraine attacks. In addition, Dramamine was taken but the patient experienced dizziness or lightheaded when he took the medication.

A couple of years later at age 6 years, the patient described beginning to experience complete migraine headaches. The patient noted that he can tell a migraine attack was to occur by visions of precursor “halo” or distorted images. These migraine attacks were indicated to occur approximately once every 3 weeks. The patient’s last migraine headache attack occurred after a collision on the football field. A football player performed an “uppercut” type of hit under the patient’s chin that snapped his head back.

Since then, the patient described experiencing a constant sharp headache with migraine episodes that occurred every day. The patient denied any palliative maneuvers or activities to his headache complaints. However, provocative maneuvers were identified as dehydration, sleep deprivation, bright fluorescent lights and loud noises.

According to the patient’s mother, her son’s headache attacks have progressively become worse and more prevalent since his puberty. Aside from the pain experienced, the patient indicated that his migraine attacks had affected his ability to concentrate in school and during football practice. As a result, the patient indicated as being “extra cautious” so as not to

trigger his migraine attacks. The patient’s mother indicated that recently she had become more concerned as her child had become “extra agitated” and less talkative when compared to teenagers she has observed. In addition to cranial pain, the patient indicated specific sites of pain associated with his headaches to the cervical spine and upper thoracic spine region. The patient described his headaches as constant and sharp that “comes and goes” with migraine intensity. Since his collision on the football field as described, he had experienced a constant sharp headache that has worsened to the point of becoming a migraine headache every 3 weeks.

### Examination

Physical examination revealed the following. On initial inspection, the patient was observed to be quiet with a modest grimace of expression. Digital palpation of the patient’s spine revealed tenderness at the interspinales muscles between the C2 and C3 spinous processes. Tenderness was also noted at the right Rectus Capitis Minor muscles. Motion palpation revealed restrictions on right Rotation of the Axis vertebrae. On attempts of active and passive range of motion, the patient indicated experiencing extreme pain and discomfort to complete the maneuvers of cervical extension.

The following orthopedic tests were notable: Rust Sign was negative; cervical compression tests in neutral, flexed and extended positions were positive for eliciting localized pain in the cervical region with pain not radiating into arms or down the spine. Neurophysiology was analyzed using the NeuroCaloGraph (NCGH), NeuroCaloMeter (NCM) and Chirometer. Asymmetric paraspinous measurements indicated a 3 point break to the left with the NCM and NCGH. Chirometer readings were 92.0 degrees Fahrenheit on the Left and 94.0 degrees Fahrenheit on the Right. Based on the history and physical examination findings, a radiographic examination was indicated.

A 3 view (Lateral, Anterior Posterior Open Mouth (APOM) and Base Posterior (BP)) cervical spine series were taken. On the lateral view, the atlas was in a superior misalignment position with a positive 17° angle (note: a positive 8-10° angle is average). The axis was in a posterior and inferior misalignment position. The posterior inferior portion of the axis vertebral body was 1 mm from the C3 vertebral body while the anterior inferior portion of the axis vertebral body was 3 mm from C3 vertebral body. A slight “wedge” or “V shaped” sign was observed at the atlantodental interspace; the inferior portion measured 1 mm and the superior portion measured 2 mm.

The APOM view revealed the C1 vertebral body as measuring 1 mm to the left of the arc lines of the Foramen Magnum Line indicative of left laterality misalignment of the C1 vertebral body. The spinous process of the C2 vertebral body measured 7 mm to the right of the Foramen Magnum Line, indicating right rotation misalignment. In the BP view, a rotation of the Atlas was measured a 1° misalignment relative to the perpendicular with the left transverse foramen posterior and the right transverse foramen anterior. The median line and the atlas line should intersect at 90 degrees.

One degree or more of rotation indicates a misalignment. Based on the history and examination findings, the spinal

listing of the first cervical vertebra was atlas superior, left posterior (ASLP) and the spinal listing of the second cervical vertebra was posterior inferior right (PRI). It was determined that the PRI subluxation at the Axis was the major subluxation due to a greater amount of misalignment with the ASLP subluxation of the Atlas as the minor subluxation.

### *Intervention & Outcomes*

With consent from the patient's mother, the patient was cared for with Kale Upper Cervical Specific Protocol. At the time of writing, the patient had attended a total of 24 visits and had received 23 adjustments. The patient continues to receive ongoing chiropractic care. On the first visit, the patient was placed in the knee-chest posture. With the patient's head turned to the right on the knee-chest solid headpiece table, a spinous process contact was made at the C2 vertebral body with the fleshy pisiform of the doctor's right hand.

The pisiform of the doctor's right hand was then used to deliver a gentle body drop toggle torque with recoil adjustment. The line of drive was posterior to anterior, right to left, and inferior to superior. Following the adjustment, the patient rested for 20 minutes before being re-evaluated. Scan with the NCGH and NCM indicated 1 point heat swing to the right and Chirometer read 94.0 degrees Fahrenheit Left / 93.0 degrees Fahrenheit Right. Immediately after the first adjustment, there was a considerable change in the child's mood and presentation. He got up from the table smiling, eyes widened. As he was resting, he noted that the sharp pressure he was experiencing prior was starting to alleviate.

On the patient's 2<sup>nd</sup> visit, the patient noted that he experienced minor pain behind his left eye for a few seconds and then "goes away." Prior to chiropractic care, the patient indicated that if he experiences pain behind the eye, migraine headaches would follow. On the 4<sup>th</sup> visit, the patient reported not experiencing any migraines the previous week. The patient also indicated that he experienced slight eye pain as previously described that "goes away." Overall, the patient experienced 5 migraine headache attacks over approximately a 24-month timespan. Prior to chiropractic care, the patient was experiencing, on average, migraine headaches once every 3 weeks.

### **Discussion**

Headache is one of the most common complaints in children, with migraine and tension-type headaches being the most frequent diseases. Migraine headaches have been placed with a prevalence of 3% in children 3–7 years old and increasing to 4–11% between 7 and 11 years old.

Migraines are more common in males in the younger years and then more common from teenage years through adulthood.<sup>6-7</sup> This has been attributed to puberty and the effects of estrogen on smooth muscles and specifically at the intracranial blood vessels. Bigal and Lipton reported that headache prevalence rises to 57-82% of 8- to 15-year-olds.<sup>8</sup>

According to The International Classification of Headache Disorders<sup>9</sup>, the diagnostic criteria for migraine without aura in children includes the following:

- A. At least five attacks fulfilling criteria B–D
- B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)
- C. Headache has at least two of the following four characteristics:
  - a. unilateral location
  - b. pulsating quality
  - c. moderate or severe pain intensity
  - d. aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs)
- D. During headache at least one of the following:
  - a. nausea and/or vomiting
  - b. photophobia and phonophobia
- E. Not better accounted for by another ICHD-3 diagnosis.

The migraine with aura attacks is said to be recurrent, lasting minutes, of unilateral fully reversible visual, sensory or other central nervous system symptoms that usually develop gradually and is often followed by headache and associated migraine symptoms. The diagnostic criteria includes the following:

- A. At least two attacks fulfilling criteria B and C
- B. One or more of the following fully reversible aura symptoms:
  - 1. visual
  - 2. sensory
  - 3. speech and/or language
  - 4. motor
  - 5. brainstem
  - 6. retinal
- C. At least two of the following four characteristics:
  - 1. at least one aura symptom spreads gradually over  $\geq 5$  minutes, and/or two or more symptoms
  - 2. each individual aura symptom lasts 5-60 minutes
  - 3. at least one aura symptom is unilateral
  - 4. the aura is accompanied, or followed within 60 minutes, by headache
- D. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded.

A migraine with aura consists of visual and/or sensory and/or speech/language symptoms, but no motor weakness. The headache is characterized by its gradual development, with each symptom lasting no longer than 1 hour, along with a mix of positive and negative features and completely reversible. The diagnostic criteria for this type of pediatric headache are:

- A. At least two attacks fulfilling criteria B and C
- B. Aura consisting of visual, sensory and/or speech/language symptoms, each fully reversible, but without
  - a. motor, brainstem or retinal symptoms

- C. At least two of the following four characteristics:
  - a. at least one aura symptom spreads gradually over 5 minutes, and/or two or more symptoms occur in succession
  - b. each individual aura symptom lasts 5-60 minutes<sup>1</sup>
  - c. at least one aura symptom is unilateral<sup>2</sup>
  - d. the aura is accompanied, or followed within 60 minutes, by headache
- D. Not better accounted for by another ICHD-3 diagnosis, and transient ischaemic attack has been excluded.

In addition to the above diagnostic considerations, findings of papilledema, retinal hemorrhage or focal findings on the neurological examination may point to a possible alternative diagnosis and referral to a specialist. Symptoms of depression, which include sadness, tearfulness and withdrawal from activities need to also be considered.

The presence of one or more of these “red flags” raises clinical concerns and point to further evaluation and referral to a specialist.<sup>8</sup> Additionally, one cannot adequately address migraine as a presenting complaint without considering the comorbid psychological problems that are present in a large number of patients – adults or children. Comorbidities include possible abuse, the inverse relationship between high blood pressure and headaches, epilepsy, and psychiatric/psychological problems including stress.<sup>10</sup>

According to Singhi et al.<sup>8</sup>, the evidence supporting the effectiveness of any intervention for pediatric headaches – pharmacological or non- pharmacological – is confounded by the fact that migraines in children are of shorter duration and have a higher rate of spontaneous remission when compared to adults.

This makes it difficult to distinguish the effectiveness of treatment from the natural course of migraine. Although up to 55% for prophylactic drugs and up to 69% for symptomatic treatment has been demonstrated in children, a high placebo response rate in children has been observed. Additionally, concerns of adverse events associated with the use of prescription medication in children is always a concern.

### Chiropractic Care

It has been more than 10 years since Alcantara and Pankonin<sup>11</sup> published their case report and review of the literature on the chiropractic care of children with headaches as the primary or comorbid complaint. The need to publish more case reports on the chiropractic care of children suffering from migraine headaches is underscored by our literature search. Since 2010, our search revealed only 3 additional manuscripts.

Jaszewski and Sorbara<sup>12</sup> described the care of a 7-year-old female born with paralysis to the right side of the face from a difficult birth. She also suffered from attention deficit disorder, difficulty concentrating, vomiting, and light sensitivity from intense migraine headaches since the age of 2. She had scoliosis with a Cobb angle measuring 13°. The patient was cared for with the Pierce “Results

System”™. Along with the improvement of subjective complaints, the comparative anterior-posterior radiographic view demonstrated a 62% improvement in Cobb angle after one month of care. Kelly and Holt<sup>13</sup> described the care of a 12-year-old male with a long history of routine, recurrent dizziness, chronic neck pain and migraines. The patient received high-velocity low amplitude thrust chiropractic adjustments for the reduction of vertebral subluxations over a twelve-month period.

The C2 and C6 spinal segments were regularly adjusted over this timeframe, as well as mid-thoracic vertebrae and the sacrum. The initial frequency of care was three chiropractic visits per week for four weeks. Visit frequency was then gradually reduced over the next 12 months to one visit per month. Besides the chiropractic adjustments, the patient was also advised to perform cervical stretches (lateral flexion, rotation and flexion/extension) twice daily. After the first week of chiropractic care, the patient reported a cessation of his headaches and neck ache. His vertigo attacks decreased in frequency and became less severe, then ceased altogether. His attendance improved dramatically at school and dropped from 223 half days absent the previous year to 56 half days absent for the 12 months after beginning chiropractic care.

Berner and DeMaria<sup>14</sup> described a 12-year old girl with complaints of severe migraines of 6 years duration. Previous chiropractic care had not helped her. The patient suffered from migraines 3 times per week and had missed over 2 months of school due to the pain. Videofluoroscopic examination of the cervical spine revealed a -45cm kyphosis.

On cervical flexion, a C1 and C6 lock was noted and upon cervical extension, T1 and T2 were locked. The patient received care over 6 visits that involved thermal scanning, radiographs, videofluoroscopy, toggle set instrument adjusting and pressure adjustments based on the Nimmo-Tonus Technique. The patient demonstrated a significant improvement in her cervical curve upon review of the patient’s follow-up videofluoroscopic examination and her migraines resolved.

In the *Journal of Clinical Chiropractic Pediatrics*, Laferrière<sup>15</sup> described the care of a 7-year-old female born with paralysis to the right side of her face attributed to birth trauma. The patient was issued a helmet to help reshape her head due to deformity. She also suffered from attention deficit disorder, difficulty concentrating, vomiting, and light sensitivity from intense migraine headaches since the age of 2 years.

The patient was also documented as having a scoliosis with a Cobb angle measuring 13 degrees. The patient was assessed and cared for in accordance with the guidelines of the Pierce “Results System.” Chiropractic care using a conservative, full spine technique was administered to correct and stabilize the vertebral subluxations. Along with improvement of subjective complaints, the patient’s comparative antero-posterior lumbopelvic radiograph demonstrated a 62% improvement in Cobb angle after just one month of care.

It is also worth mentioning from our examination of the literature of the last 10 years of the study by Tuchin et al.<sup>16</sup> The investigators performed a randomized controlled trial of 6

months' duration involving two months of chiropractic SMT (diversified technique) at vertebral fixations determined by the practitioner (maximum of 16 treatments) in 127 volunteers between the ages of 10 and 70 years suffering from migraines according to the International Headache Society.

The average response of the treatment group (n = 83) showed statistically significant improvement in migraine frequency (P < .005), duration (P < .01), disability (P < .05), and medication use (P < .001) when compared with the control group (n = 40). Four persons failed to complete the trial because of a variety of causes, including change in residence, a motor vehicle accident, and increased migraine frequency. Expressed in other terms, 22% of participants reported more than a 90% reduction of migraines as a consequence of the 2 months of SMT. Approximately 50% more participants reported significant improvement in the morbidity of each episode.

The pathophysiology of migraine headaches is thought to occur as a result of a cascade of events leading to activation of pain-sensitive intracranial structures including the dural venous sinuses, large intracranial cerebral vessels and dura mater, along with a decrease in endogenous pain control pathways.<sup>6</sup> The use of SOT cranial therapy in the care of this and similar patients would seem appropriate given the framework of the technique on the importance of the cranium and its associated structures and of course, the successful outcome of care. The need to explore and, more importantly, to document the success of chiropractors in the care of children with headaches is urgent. Although it has been suggested that over 50% of children will experience a spontaneous remission after puberty, migraines that initiate in adolescence is said to continue into adulthood.

A longitudinal study from Sweden (73 children with 'pronounced' migraine and mean onset age of 6 years) with more than 40 years of follow-up found that migraine headaches had ceased before the age of 25 years in 23% of people. However, by the age of 50 years, more than half of people continued to have migraine headaches.<sup>4</sup> An evaluation by Barnes<sup>4</sup> using GRADE (Grading of Recommendations, Assessment, Development and Evaluations), a transparent framework for developing and presenting summaries of evidence and provides a systematic approach for making clinical practice recommendations. In this case, medical interventions for migraine headache in children.

The evidence was found to be of very low quality (i.e., Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate) except for 2 studies deemed of moderate quality evidence (i.e., Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate): One examining Sumatriptan versus placebo and Eletriptan versus placebo.

### Limitations

The post-positivist paradigm of research is based on the ontology that it's a material world. The epistemology of this paradigm focuses on maintaining objectivity such as in randomized controlled clinical trials. However, case reports serve to describe the clinical encounter and showcase possible clinical expertise in the care of patients. Based on the post-

positivist paradigm, case reports are fraught with bias (i.e., the lack of a control group, the effects of placebo, and natural history) and makes cause and effect inferences difficult. It also makes our ability to generalize one clinical scenario to similar scenarios questionable.

With an ontology based on individual experience/perception and an epistemology that emphasizes the meaning of human experience, constructivism resonates more with the chiropractic clinical encounter. Based on this research paradigm, we learn (individually and collectively) from our clinical experience to advise future patients on the effectiveness and safety of our care approaches.

### Conclusion

We described the care of a 15-year-old male suffering from chronic recurrent migraine headaches with successful outcomes using Kale Upper Cervical Specific Protocol. We encourage continued documentation in the care of similar patients to inform practice and research.

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