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# CASE STUDY

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## Resolution of Vision Loss in a Teenage Girl Following Upper Cervical Chiropractic Care: A Case Study & Review of the Literature

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### ABSTRACT

**Objective:** This case study reports the resolution of vision loss in an 18-year-old female undergoing upper cervical chiropractic care.

**Clinical Features:** An 18-year-old female presented to a chiropractic office complaining of mid-back, neck and low back pain, shoulder pain and numbness and tingling in both left and right arms and into her left leg and foot. After suffering a stroke four years prior, the patient underwent surgery to repair the arteriovenous structure of her right temporal lobe. Immediately following surgery she reported blurry vision and a loss of the lateral portion of the visual field of her left eye. The vision in her left eye diminished over the following three years, before becoming completely blind. She suffered from migraines and seizures as well.

**Intervention and Outcomes:** After two upper cervical adjustments utilizing Toggle Recoil Technique, the patient experienced full resolution of the visual loss in her left eye. After 11 weeks her eyesight was still intact. Her migraines and seizures reduced in frequency and severity.

**Conclusions:** The patient in this case experienced a full resolution of vision loss after only two chiropractic adjustments. This outcome demonstrates that more research is necessary to determine the link between chiropractic care and visual loss.

**Key Words:** *Subluxation, Chiropractic, Adjustment, Toggle Recoil Technique, Vision, Seizures, Arteriovenous Malformation, Stroke, Postoperative Vision Loss*

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### Introduction

#### *Incidence*

Postoperative vision loss (POVL) is a rare complication that is generally associated with spine and cardiac surgeries.<sup>1,2</sup> In one retrospective review of 3,450 surgeries, only seven cases were identified as having postoperative complications of a loss of

vision, giving it an incidence of 0.20%.<sup>3</sup> Another retrospective review conducted by Johns Hopkins hospital looked at spinal surgeries over a 20-year period (January 1982-December 2002). Of the 14,102 cases reviewed, only six cases involved a

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discharge diagnosis involving visual impairment that was not present before surgery.<sup>3,4</sup> In addition, another study, reviewed the incidence on POVL present in the US Nationwide Inpatient Sample (NIS). This study examined the frequency of POVL as they corresponded to the eight most commonly performed surgical procedures. Of the procedures reviewed, those with the highest frequencies were spine (3.09/10,000) and cardiac surgeries (8.64/10,000).<sup>1</sup>

### *Classifications of POVL*

Grover and Jangra classify incidences of postoperative vision loss into five types.<sup>2</sup>

**External ocular injury:** Extra ocular injury in surgery is generally the result of trauma to the cornea and can result in general irritation, abrasion and possible laceration. These traumas increase the risk of inflammation in the eye and leave it susceptible to infection.

**Cortical blindness:** Cortical blindness in postoperative patients is often seen with signs of stroke, particularly in the parietal and occipital lobes. Although visual loss generally returns within days of the incident, it may remain partially impaired.

**Retinal Ischemia:** When the blood supply to the eye is decreased, via the central retinal artery, unilateral vision loss is often a result. This can be caused by local factors (embolism in the central retinal artery or decreased venous drainage) or by systemic factors. This type of vision loss is most commonly seen as a result of compression of the eye due to improper patient positioning during surgery.

**Ischemic optic neuropathy:** Ischemic optic neuropathy is categorized into two subtypes, arteritic or nonarteritic. These terms are used to describe whether or not the vision loss is secondary to inflammation of the associated blood vessels. In postoperative vision loss, nonarteritic ischemic optic neuropathy (NAION) is more common. There is a stronger incidence of NAION secondary to cardiothoracic, spinal fusions and head and neck surgeries.

**Acute glaucoma :** This bilateral type of POVL is rarely seen in patients who underwent general anesthesia. Symptoms of postoperative acute glaucoma include eye pain, blurred vision and is often accompanied by headache, nausea and vomiting.

### *Treatments for Postoperative Vision Loss*

Current treatments for POVL vary by type, but are generally not satisfactory. For example, in the case of central retinal artery occlusion, where embolism is suspected, treatment can include massage to dislodge the embolism or thrombolytic surgery.<sup>2</sup>

### **Case Report**

An 18-year-old female presented to a chiropractic office complaining of mid-back, neck and low back pain, shoulder pain and numbness and tingling in both left and right arms and into her left leg and foot. She also complained of loss of vision in her left eye of two years duration, migraines, seizures, tinnitus, vertigo and digestive disorders of four years duration.

The patient suffered a stroke four years prior, due to arteriovenous malformation. This stroke resulted in surgery to repair the arteriovenous structure of her right temporal lobe. Immediately following surgery she reported blurry vision and a loss of the lateral portion of the visual field of her left eye. She also began to experience migraine headaches up to four times per week and having seizures that have resulted in multiple falls. She suffered a concussion when her head was hit by a car door. Over the course of the next three years, the vision in her left eye diminished slowly until she had total vision loss in that eye. Medications include Keppra, Toradol and Zolof, accompanied by vitamin supplements, probiotics and antihistamines.

### *Examination*

Examination of this patient was conducted on the initial visit. The range of motion of the cervical spine was assessed and was determined to be reduced in right rotation, right lateral flexion and flexion/extension.

A prone leg check was performed according to the respective leg check analysis developed by Dr. J. Clay Thompson<sup>6</sup> and Dr. Clarence Prill<sup>7,8</sup>, which indicated a short right leg.

Leg checks are performed on a prone or supine patient. The examiner notes if one leg appears to be longer in respect to the other. This analysis is believed to be an effective way of reading the condition of the nervous system. One theory, proposed by Grostic<sup>5</sup>, describes the relationship of the dentate ligament and its effect on upper cervical dysfunction on the osseous and soft tissue structures of the body. This theory recognizes that the dentate ligament is a continuation of the pia mater, which extends the length of the spinal canal. Its attachments to the spine itself make it of particular interest to chiropractic theory. Because the most lateral aspect of the spinal cord provides nerve supply to the most caudal structures, the connection between pelvic malposition and cervical dysfunction can be illustrated.<sup>5</sup> This relationship provides ample reason to suspect that irritation caused by cervical subluxation can change pelvic position and affect leg length. It is under this premise, among others<sup>6</sup>, that leg length analysis is performed.

### *Thermography*

The surface temperature of the patient's cervical region was measured using thermographic analysis. It was observed that the patient had asymmetrical thermographic readings and an established pattern according to the guidelines of Pattern Analysis.<sup>12</sup>

In a healthy patient, the autonomic nervous system effectively controls temperature regulation through dilation and constriction of blood vessels. As the external temperature increases, the internal temperature must decrease to accommodate the change. Conversely, when the external temperature decreases, the internal temperature must increase. These changes of temperature within the body occur as the autonomic nervous system works with the circulatory system to dilate and constrict the blood vessels to keep the surface temperature within a manageable range.<sup>9,10</sup> When vertebral subluxation is present in the nervous system, the normally

symmetrical temperature gradients develop an asymmetrical pattern. The analysis of this pattern is used to determine the efficiency of the autonomic nervous system and its ability to adapt to its environment.<sup>11</sup>

The patient was referred to an imaging specialist to receive X-Ray imaging and upon interpretation of the cervical films it was determined that the patient had a malposition of the C1 vertebra. After the initial examination was completed the patient was determined to have an upper cervical subluxation at C1 and she received chiropractic adjustments reflecting the findings of the examination.

### *Toggle Recoil Technique*

The chiropractic technique utilized for this patient was the Toggle Recoil technique for the upper cervical subluxation complex, developed by Dr. BJ Palmer at the Palmer School of Chiropractic in 1918.<sup>13-15</sup> The chiropractic adjustment is made as the practitioner contacts the transverse process of C1 or the lamina of C2 with the pisiform of the superior hand. Stabilizing with the inferior hand, a high velocity, low amplitude thrust is delivered to the side lying patient, followed by a recoil of the overlapped hands. This high velocity thrust and recoil is used as a means to increase “shearage” of the involved segments.<sup>16</sup> The use of torque in the adjustment can be applied in reference to the malposition of the segment being adjusted.

### *Outcomes*

Following the patient’s first adjustment no immediate change was noted and a new appointment was scheduled. The second adjustment was administered five days following the previous appointment. Immediately after the adjustment was given the patient reported seeing “sparkles” in the left eye. The patient was left to rest on the table. After approximately 15 minutes of rest, the patient experienced a full resolution of the vision loss in her left eye. The patient was seen weekly to monitor progress. During each visit, leg length analysis was used to determine if additional adjustments were needed. Eleven weeks after the second adjustment, a third adjustment was given. At this time it was reported that the patient was still experiencing a resolution of the vision loss in the left eye. In addition, the patient reported a resolution of neck and back pain and a reduction of frequency of seizures and migraine headaches.

## **Discussion**

### *Review of the Literature*

A review of the literature was conducted using the Index to Chiropractic Literature<sup>17</sup> and PubMed<sup>18</sup> databases. The search terms utilized for this review included “vision”, “visual loss”, “visual field”, “chiropractic” and “spinal manipulation” and were entered in various combinations to produce the greatest number of results. This search resulted in 25 unique entries. The results of interest to this discussion are listed below:

Blum and Cuthbert described a 20-year-old patient with vision loss in the right eye as a complication of Arnold Chiari malformation, following a motor vehicle accident. The patient

was assessed using applied kinesiology (AK) protocols and muscle testing, which revealed frontal cranial bone and sphenoid subluxation. Following correction of the involved structures the patient remarked a return of vision in her right eye.<sup>19</sup>

Stephens, Pollard, Bilton, Thompson and Gorman reported the case of a 53-year-old woman who suffered from migraines and a fractured right zygomatic arch after falling down a stairwell. Three weeks after the accident the patient reported vision in the contralateral eye had reduced to only light perception. After 20 treatments of chiropractic spinal manipulation the patient reported full resolution of her vision.<sup>20</sup>

Edwards and Alcantara performed a case study of a 28-year-old pregnant female who presented with migraine headaches, hypothyroidism and tachycardia. During the patient’s 38<sup>th</sup> week of gestation she reported a lack of peripheral vision in her right eye, tingling in her right hand and a “cloudy” feeling in her head. Following adjustments of the cervical spine the patient reported complete resolution of her symptoms.<sup>21</sup>

Knowles, Knowles and Irastorza showed improvement in vision of two years in a 46-year-old male with diabetic retinopathy. The patient also had developed bilateral numbness in his hands and fingers 9 years prior. Following eight months of care the patient reported that he was able to see colors and shapes in the affected eye. Additionally, the patient’s retina specialist reported that the intraocular pressure had reduced to within normal limits, from 50 mm Hg to 18 mm Hg.<sup>22</sup>

Gorman and Wingfield discuss a case of a 25-year-old female with impaired vision despite having received radiotherapy and multiple surgeries to remove xanthogranulomas and reduce intraocular pressure. The patient presented to a chiropractor complaining of back pain, neck pain and headaches. Immediately following the first chiropractic adjustment, the patient reported a vast improvement of her visual field. This was followed up by use of Goldman perimetry to assess change in her visual field. The total visual field had increased from 2% to approximately 11%.<sup>23</sup>

Gorman performed a case study of a 9-year-old who presented with headaches and constricted visual fields. Prior to receiving care the patient received examination from an optometrist, who confirmed the diagnosis. Following osteopathic adjustment under anesthesia, the patient’s vision was found to be normal. This result was confirmed using Goldman perimetry.<sup>24</sup>

Gorman presented a case study of a 44-year-old woman with bilateral loss of visual fields. The vision loss resolved immediately following spinal manipulation under anesthesia. The vision loss recurred on two separate occasions, but were each resolved following after receiving spinal manipulation.<sup>25</sup>

There are many theories<sup>26</sup> described in chiropractic literature that address how dysfunction in the nervous system caused by a malposition of spinal vertebra can affect, both somatic and visceral structures. This phenomenon, termed “subluxation” is the foundation for chiropractic practice and theory. Stephenson described the subluxation and assigned criteria to

its diagnosis. He states that in order for a subluxation to be present a vertebra must have “lost its proper juxtaposition with the one above or the one below, or both; to an extent less than a luxation; which impinges nerves and interferes with the transmission of mental impulses.”<sup>27</sup> In order to understand the implications of this case, we must further examine the relationship between the spinal nerves and the visual cortex. As discussed previously, postoperative vision loss has a high correlation to decreased arterial flow in the arteries that supply blood to the eye and its supporting structures. To better understand the implications of the treatments and outcomes of this case study, further examination of the relationship of the visual cortex and the spinal nerves is necessary.

Gorman<sup>23,24,28-29</sup> has described one theory demonstrating visual improvements following manipulation of spine. He proposes that dysfunction of the cervical spine irritates the surrounding sympathetic nerves. When irritated, these nerves cause the adjacent vertebral artery to go into spasm, restricting blood flow to the brain. Before terminating as the posterior cerebral arteries the vertebral arteries supply nearly all of the blood flow to the visual cortex. As blood supply to this part of the brain decreases, the function is compromised and visual impairment is likely.<sup>22,23</sup>

Korr<sup>30</sup> stated that when the impulses of the sympathetic nervous system increase, alteration of the responses of hormones, infectious agents and blood vessels occurs. Kent<sup>26</sup> describes this effect as a “Neurodystrophic” model of subluxation and adds that when the thresholds of afferent neurons are decreased, the amount of neural impulses to the associated somatic and visceral structures increases.

## Conclusion

This case study presented an 18-year-old female with vision loss in her left eye that occurred after brain surgery. After two upper cervical chiropractic adjustments her vision was restored while still in the chiropractor’s office. The immediate improvement in her vision and its direct result to chiropractic adjustments adds to the evidence of chiropractic care and its influence in visual field perception. This case study is limited in its ability to give a definitive conclusion and more research is needed to better support the evidence of the vertebral subluxation complex and its effects on the body.

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