



# Presentation of an 85-Year-Old Woman With Musculoskeletal Pain to a Chiropractic Clinic: A Case of Ischemic Stroke

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Chiropractic;  
Acute subdural  
hematoma;  
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## Abstract

**Objective:** The purpose of this case is to describe a patient who had a stroke preceding a chiropractic appointment and was unaware that the cerebrovascular event had occurred.

**Clinical features:** An 85-year-old established patient presented for chiropractic treatment of pain in the left side of the neck, hip, and low back associated with known advanced degenerative spinal disease and lumbar stenosis. On the day of presentation, the patient reported morning nausea, double vision, and right-sided vision loss; she related that she had collided into a car while driving to the appointment. Review of her medical history divulged residual neurological deficits related to a previous subdural hematoma, resulting in craniotomy. Examination revealed a right inferior quadrantanopia in the right eye and right nasal hemianopia in the left eye. Nystagmus was present in the left eye with saccadic intrusion on pursuit right to left.

**Intervention and outcome:** The patient was transported immediately to an emergency room, where diagnosis of an Acute infarct in the left cerebrum at the junction of the left occipital, parietal and temporal lobes in the watershed area was confirmed.

**Conclusion:** Patients with signs and symptoms of stroke in progress may occasionally present for chiropractic care. It is imperative to complete a thorough history and examination prior to care.

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## Introduction

Stroke is currently the fourth leading cause of death in the United States and the leading cause of disability, according to the US Centers for Disease Control and Prevention. Cerebrovascular accident (CVA) kills

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approximately 130,000 Americans annually; on average, 1 American dies from a stroke every 4 minutes.<sup>1,2</sup> Approximately 800,000 strokes occur annually, often resulting in serious, life-altering complications.<sup>1,3</sup> Around 87% of all strokes are ischemic, which occur when an intraluminal thrombus forms in the blood vessel and embolizes distally in the arteries of the brain.<sup>2,4</sup> The symptoms of ischemic stroke are generally sudden, with onset of neurological deficit correlating specifically to arterial damage in the involved area of the brain supplied by the damaged artery. The remaining 13% of strokes are vertebral artery dissections (VADs), which are flap-like tears in the tunica intima of the vertebral artery.<sup>5</sup> Activities resulting in sudden or sustained rotation and extension of the neck are implicated in vertebral artery damage, such as motor vehicle accidents, looking over the shoulder while driving, falling, sneezing, coughing, overhead activities, lifting, and certain sporting activities.<sup>4</sup>

There is conflicting information in the literature regarding cervical spine manipulation and stroke. Some have challenged the causal dispute and report that there is no increased association between chiropractic manipulation and stroke, but rather the possibility of an increased likelihood pertaining to chiropractic visits and/or visits to primary care physicians (PCPs) for the treatment of neck pain and/or headache prior to the diagnosis of a stroke.<sup>4,7</sup> Head and neck pain commonly coincides with cerebrovascular accidents. Therefore, symptoms of VAD, the most common being head and neck pain, cause patients to seek chiropractic care.<sup>4,6</sup> Thus, some patients who present for chiropractic care may already be experiencing a stroke prior to any care provided.

There is a growing body of case reports that describe such encounters. Subsequently, the purpose of this case report is to describe a patient who had a stroke preceding a chiropractic appointment and was unaware that the cerebrovascular event occurred.

## Case Report

An 85-year-old female and long-term chiropractic patient presented for a previously scheduled appointment to address generalized left-sided weakness, left-sided neck pain, and ongoing musculoskeletal treatment for hip and low back pain related to advanced spinal degenerative disease and an anatomical left short leg. While walking from the waiting area to the treatment room, the patient displayed a right gait drift.

History disclosed right-sided visual loss since that morning, with the patient stating that “I could not see out of the right side of my right eye,” as well as double vision that has since remitted. Additionally, the patient reported running into a car parked on the right side of the street while driving approximately 20 mph on the way to the appointment. The patient reported no additional symptoms or trauma related to the incident. The patient experienced morning nausea and denied dizziness or difficulty swallowing. She did admit to experiencing a transient loss of vision that morning while straining during a bowel movement, as well as eating only the left half of the food on her plate, pointed out by her peers during breakfast. The patient said she had attempted to contact her neurosurgeon that morning but was unable to make an appointment. She was adamant that she did not want to go to the emergency department (ED).

The patient had not had a chiropractic appointment for the past 6 months.

When questioned about changes in health or recent medical procedures, she reported hospitalization related to frequent constipation, for which she was prescribed Senokot. She also had experienced 2 falls within the past 5 months, explaining that, 1 month following a fall, she felt “wobbly.” She was sent to the hospital by her home care facility and was diagnosed with a chronic subdural hematoma that was posttraumatic in relation to previous falls. A right-sided craniotomy was performed, and her general practitioner subsequently discontinued warfarin. Following surgery, residual symptoms of urinary difficulty, problems swallowing, hoarseness, gait disturbance, and short-term memory loss persisted.

Medical history included gender reassignment surgery at age 65 and a 30-year history of estrogen therapy. She had a history of atrial fibrillation, for which she took amiodorone. She had previously been prescribed Coumadin for atrial fibrillation and deep venous thrombosis. She has a medical history of monoclonal gammopathy, hypertension, gastric reflux disease, and depression. She has benefitted from chiropractic care for the treatment of musculoskeletal conditions, including cervical and lumbar spinal dysfunction with advanced degenerative disease, cervical myelopathy, L4-5 stenosis, and associated kinetic chain dysfunction.

Physical examination revealed normal station with right gait preponderance. The patient was alert and oriented to person, place, and time. Her vital signs were normal, with a blood pressure of 112/60 mmHg, left arm seated. Her heart rate was 60 beats per minute; and

respiration rate was 10 counts per minute, with an oral body temperature of 96.3°F. The patient was 68 in tall and weighed 152 lb. Neurological examination revealed intact olfaction, with apparent difficulty deciphering scents. Direct and consensual pupillary light response was intact bilaterally, with evidence of right inferior quadrantanopia in the right eye and right nasal hemianopia in left eye. Accommodation was intact. The patient had difficulty pursuing the doctor's finger from right to left, displaying rapid correcting movements. Trigeminal nerve testing of crude touch was intact in ophthalmic, maxillary, and mandibular nerve divisions bilaterally. Muscles of mastication were intact, as shown by clenching jaw; pterygoid muscle strength was intact, as displayed by resistance upon pressure application while patient open the jaw. Facial nerve evaluation displayed difficulty maintaining puffed cheeks on lower right side of the face (reported by patient to be residual symptoms of subdural hematoma). Motor strength of facial muscles was intact, with ability to raise eyebrows, frown, smile, and close eyes tightly. Weber test lateralized to the right ear, with air conduction greater than bone conduction. Palate elevation was equal bilaterally, and tongue was midline upon protrusion. Softening of the patient's voice was evident as the duration of the visit proceeded.

Rapid alternating pronation and supination hand movements were performed, better on the right side compared to the left. Romberg test displayed ability to maintain upright stance with eyes open and closed; single leg stance was performed without difficulty bilaterally. Sensation to include crude touch was intact symmetrically in the upper and lower extremities. Motor status of upper and lower extremity was 5/5 bilaterally. Myotatic reflexes revealed patellar reflex of +3/5 bilaterally, whereas biceps, brachioradialis, triceps, finger flexion, and gastrocnemius reflexes were all +2/5 bilaterally.

Following evaluation and discussion of the differential diagnosis, the patient refused the recommended emergency transport to the ED. Her PCP was immediately contacted, and it was mutually decided that the patient would be most compliant if she was transported to the ED by a close friend who had accompanied her to the appointment. This course of action was recommended by the patient's PCP and agreed upon after a brief discussion of the patient's clinical status and known anxiety regarding hospital admissions.

Preinfusion computed tomographic imaging reported a zone of diminished density in the left cerebrum lateral to the left occipital lobe in the watershed vascular area, which is between the middle and posterior cerebral

artery distributions of the left temporal and parietal lobes, with microvascular ischemic changes noted. This was confirmed by preinfusion magnetic resonance imaging, verifying an acute infarct in accordance with the patient's clinical presentation. An evolving chronic subdural hematoma over the right cerebral hemisphere was also noted. The patient was transported immediately to an emergency room, where diagnosis of an acute infarct in the left cerebrum at the junction of the left occipital, parietal and temporal lobes in the watershed area was confirmed.

The patient recovered with minimal visual residuals. She continues to receive chiropractic care on a regular basis for symptoms related to cervical spine degeneration and lumbar spine stenosis, which includes gentle low-force manual techniques such as pelvic blocking and grade 3 mobilizations of cervical and thoracic spine. The patient authorized the use of her clinical data for this case report.

## Discussion

Neck pain and headache are symptoms for which patients commonly seek chiropractic care. These are also symptoms that precede potentially life-threatening events such as CVAs. In this particular case, the patient's appointment was scheduled over 1 week in advance; prior to this, the patient had not visited her chiropractor in the past 6 months. Coincidentally, significant clinical events had occurred within 24 hours preceding this appointment that were later confirmed by imaging studies performed at the ED diagnosing stroke.

There are numerous pathological processes that can lead to stroke, including but not limited to atherosclerosis, arterial dissection, hemorrhage, and arteriovenous malformations.<sup>6</sup> The patient discussed in this case report had numerous risk factors for stroke, including hypertension, atrial fibrillation, history of deep vein thrombosis, and 30 years of hormone replacement therapy. Her history verifies that she was prone to clot formation and was required to discontinue Coumadin due to recent subdural bleed, which further increased her risk of CVA.

For more than 70 years, there have been comments made by some authors suggesting that chiropractic manipulative therapy and CVAs, particularly VAD, were linked; however, substantial proof of this link has not been offered. VAD is an important factor in relation to stroke and often presents nonspecifically; therefore,

it can be misdiagnosed with adverse consequences.<sup>8</sup> Neurologists and general medical practitioners commonly propose that there is a causal relationship between manipulation and VAD leading to stroke and these events are common, whereas doctors of chiropractic argue that there may be a link but the events are coincidental or rare.<sup>6,9</sup> Vertebral artery dissection commonly presents with nonspecific symptoms including dizziness, vertigo, headache, and neck pain. Gottesman et al<sup>8</sup> conducted a systematic review of observational studies searched via electronic databases, with inclusion criteria of more than 5 subjects with clinical or radiological features of VAD. Seventy-five studies were selected, and the following most common symptoms related to VAD were observed: dizziness/vertigo (58%), headache (51%), and neck pain (46%). Stroke was found to be common (63%), with the majority being extracranial dissections (66%), whereas transient ischemic attack (14%) and subarachnoid hemorrhage (10%) were found to be uncommon.<sup>8</sup>

A case study in the literature demonstrated the importance of a thorough history and examination. A 49-year-old man with chronic, nontraumatic episodic head and neck pain presented for chiropractic care. Physical examination and radiographs were unremarkable; however, history of chief complaint raised concern. This patient was not manipulated and instead was referred to her general practitioner for further evaluation. One week later, the patient was admitted to the hospital with report of CVA.<sup>10</sup>

Similarly, a retrospective case series of 6 patients from a rural Mississippi chiropractic practice described cases that either presented with signs and symptoms of stroke, or had died as a result of stroke without presenting to the chiropractic office. Common presenting complaints in these cases were unilateral arm weakness, slurred speech, dysphagia and dysphonia, episodic loss of vision, and same-sided leg weakness. This case series confirmed that patients with signs and symptoms of stroke may infrequently present for chiropractic care; and therefore, recognition of such symptoms is a cornerstone of referral and must prompt immediate attention.<sup>11</sup>

The mechanism associated with manipulation and CVA must be considered. One study investigated vertebral artery strain during high-speed, low-amplitude cervical spinal manipulation in cadaveric specimens. Results concluded that average and maximal vertebral artery strains during high-speed, low-amplitude cervical manipulation are considerably less than strains incurred during active range of motion testing.<sup>12</sup> Another similar study on the carotid artery found similar results.<sup>13</sup>

Other studies suggest that there is a link. Ernst summarized 31 case reports (42 individual cases) between January 1995 and September 2001 that associated adverse events following manipulation of the cervical spine. Arterial dissection preceding stroke was the most common serious adverse event, reporting prevalence in 18 of the cases.<sup>14</sup> Additionally, de Bray and colleagues estimated that 12% of VBA dissections follow cervical spine manipulation. This study, however, included only 7 patients, 3 of whom had one or more vascular risk factors, including right carotid artery dissection 10 years prior, smoking, and hypertension. De Bray et al reported that VAD was spontaneous in 4 patients, occurred following cervical manipulation in 1 patient, and occurred following injury to the neck in another.<sup>15</sup>

Cassidy et al performed a population-based, case-control, and case-crossover study investigating the associations in VBA stroke, contrasting visits to chiropractors vs PCPs in 818 patients. The inclusion criteria consisted of patients who experienced VBA strokes and were admitted to hospitals in Ontario between 1993 and 2002. Medical records revealed 818 VBA stroke cases within a population of more than 100 million persons, as well as details regarding visits to PCPs and/or doctors of chiropractic within 1 year prior to date the patient experienced stroke. Results of the study concluded that, although there was a correlation with VBA strokes and chiropractic visits, there was also a similar association with visits to PCPs. The outcomes confirm that the relationship is likely related to patients seeking care for head and neck pain prior to having a VBA stroke. Results concluded that 93% of VBA stroke cases had visited a chiropractor within 1 year prior to their stroke, with the majority of cases also having visited a physician during this year. It was reported that 75.3% of patients had comorbidities, the top 3 being neck pain and headache, circulatory disease, and nervous system disease.<sup>4</sup> Similar studies have concluded that stroke was coincidental to cervical manipulation, reflecting the "natural history of the disorder."<sup>16</sup>

Careful review of the literature when investigating stroke and cervical spinal manipulation is essential. A review of 901 cases of cervical artery dissection (CAD) and 707 incidents of stroke reported in association with cervical spine manipulation demonstrated that the literature infrequently reports useful data allowing for understanding the association between CAD, stroke, and spinal manipulative therapy. Enhancing the quality of reporting adverse



events is necessary, as the authors state that “there are deficiencies in reporting key factors associated with CAD and cervical spinal manipulative therapy.”<sup>17</sup>

Readers must be aware of potential misuse of the literature by authors in association with spinal manipulative therapy and adverse outcomes. Terrett conducted a review of studies investigating cases linking the term *chiropractor* and *chiropractic* to manipulative injury. He found that many of the practitioners performing manipulation were named as chiropractor, but did not indeed hold a chiropractic license. In this review, Terrett reports numerous published studies using the term *chiropractor* in which the profession of the person performing manipulation was found to actually be an osteopath, medical practitioner, physiotherapist, naturopath, masseuse, or barber.<sup>18</sup>

### Clinical Recommendations

It is imperative that practitioners performing spinal manipulation, including doctors of chiropractic, physiotherapists, medical doctors, and doctors of osteopathy, remain vigilant with patients who present with neck pain or other major signs and symptoms of cerebrovascular accidents, such as dizziness, vertigo, light-headedness, visual disturbances, ataxia, nausea and vomiting, loss of sensation, and headaches, even when more specific neurologic findings are absent.<sup>8</sup> This is particularly important in patients with comorbidities, risk factors, and/or family history of CVA. Prior to treating any established patient who presents after several months with his or her usual or unusual complaint, it is important to perform a comprehensive physical examination and update medical decision making before rendering an ongoing treatment plan. The indication of a CVA or prodrome of a CVA may lie in the case history rather than in physical examination findings.<sup>5,10</sup> In this case, it is possible that if a detailed examination and history had not been done, this patient's CVA may have been attributed to the encounter with the chiropractor and may have been associated as causally related to the vascular event.

### Limitations

A case report cannot prove or disprove cause and effect relationships. As well, we recognize that not all patients experiencing a stroke in progress will present with signs or symptoms or have positive historical findings that would point to a stroke. Therefore, detection may not always be possible. Nonetheless, prudent

practice behaviors, such as performing a thorough history and examination prior to care, are recommended.

### Conclusion

This report describes the identification of a stroke in progress in a patient presenting with head and neck pain. Patients with signs and symptoms of stroke in progress may occasionally present for chiropractic care. It is imperative to complete a thorough history and examination prior to providing treatment and refer the patient immediately to emergency services.

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### References

1. Towfighi A, Saver JL. Stroke declines from third to fourth leading cause of death in the United States: historical perspective and challenges ahead. *Stroke* 2011;42(8):2351–5.
2. Kochanek KD, Xu JQ, Murphy SL, Miniño AM, Kung HC. Deaths: final data for 2009. *Natl Vital Stat Rep* 2011;60(3).
3. CDC. Stroke. Atlanta, GA. Centers for Disease Control and Prevention [Internet]. 2012 Oct 16 [updated 2013 Mar 20]. Available from: [http://www.cdc.gov/stroke/facts\\_statistics.htm](http://www.cdc.gov/stroke/facts_statistics.htm).
4. Cassidy JD, Boyle E, Côté P, et al. Risk of vertebrobasilar stroke and chiropractic care: results of a population-based case-control and case-crossover study. *Spine* 2008;33(Suppl):S176–83.
5. Mosby JS, Duray SM. Vertebral artery dissection in a patient practicing self-manipulation of the neck. *J Chiropr Med* 2011; 10(4):283–7.
6. Murphy DR. Current understanding of the relationship between cervical manipulation and stroke: what does it mean for the chiropractic profession? *Chiropr Osteopat* 2010;18:22.

7. Rothwell D, Bondy S, Williams J, Bousser M-G. Chiropractic manipulation and stroke: a population-based case-control study. *Stroke* 2001;3:1054–60.
8. Gottesman RF, Sharma P, Robinson KA, et al. Clinical characteristics of symptomatic vertebral artery dissection: a systematic review. *Neurologist* 2012;18(5):245–54.
9. Lee KP, Carlini WG, McCormick GF, Albers GW. Neurologic complications following chiropractic manipulation: a survey of California neurologists. *Neurology* 1995;45(6):1213–5.
10. Kier AL, McCarthy PW. Cerebrovascular accident without chiropractic manipulation: a case report. *J Manipulative Physiol Ther* 2006;29(4):330–5.
11. Leach RA. Patients with symptoms and signs of stroke presenting to a rural chiropractic practice. *J Manipulative Physiol Ther* 2010;33(1):62–9.
12. Herzog W, Leonard TR, Symons B, Tang C, Wuest S. Vertebral artery strains during high-speed, low amplitude cervical spinal manipulation. *J Electromyogr Kinesiol* 2012;22(5):740–6.
13. Herzog W, Tang C, Leonard T. Internal carotid artery strains during high-speed, low-amplitude spinal manipulations of the neck. *J Manipulative Physiol Ther* 2012, <http://dx.doi.org/10.1016/j.jmpt.2012.09.005> pii: S0161-4754(12)00156-X.
14. Ernst E. Manipulation of the cervical spine: a systematic review of case reports of serious adverse events, 1995-2001. *Med J Aust* 2002;176(8):376–80.
15. de Bray JM, Penisson-Besnier I, Dubas F, Emile J. Extracranial and intracranial vertebrobasilar dissections: diagnosis and prognosis. *J Neurol Neurosurg Psychiatry* 1997;63(1):46–51.
16. Choi S, Boyle E, Côté P, Cassidy JD. A population-based case-series of Ontario patients who develop a vertebrobasilar artery stroke after seeing a chiropractor. *J Manipulative Physiol Ther* 2011;34(1):15–22.
17. Wynd S, Westaway M, Vohra S, Kawchuk G. The quality of reports on cervical arterial dissection following cervical spinal manipulation: a systematic review. *PLoS One* 2013;8(3):1–8 [e59170].
18. Terrett AG. Misuse of the literature by medical authors in discussing spinal manipulative therapy injury. *J Manipulative Physiol Ther* 1995;18(4):203–10.