

# **Risk of Vertebrobasilar Stroke and Chiropractic Care: Results of a Population-Based Case-Control and Case-Crossover Study**

## **Spine**

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FROM ABSTRACT:

**Objective.**

To investigate associations between chiropractic visits and vertebrobasilar artery (VBA) stroke and to contrast this with primary care physician (PCP) visits and VBA stroke.

**Summary of Background Data.**

Chiropractic care is popular for neck pain and headache, but may increase the risk for VBA dissection and stroke. Neck pain and headache are common symptoms of VBA dissection, which commonly precedes VBA stroke.

**Results.**

There were 818 VBA strokes hospitalized in a population of more than 100 million person-years.

In those aged <45 years, cases were about three times more likely to see a chiropractor or a PCP before their stroke than controls.

There was no increased association between chiropractic visits and VBA stroke in those older than 45 years.

Positive associations were found between PCP visits and VBA stroke in all age groups.

Practitioner visits for headache and neck complaints were highly associated with subsequent VBA stroke.

**Conclusion.**

VBA stroke is a very rare event in the population.

The increased risks of VBA stroke associated with chiropractic and PCP visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke.

We found no evidence of excess risk of VBA stroke associated chiropractic care compared to primary care.

## THESE AUTHORS ALSO NOTE:

With respect to neck manipulation and vertebral artery dissection, “the prevailing theory is that extension and/or rotation of the neck can damage the vertebral artery, particularly within the foramen transversarium at the C1-C2 level.”

Activities leading to sudden or sustained rotation and extension of the neck that have been implicated in vertebral artery dissection, included motor vehicle collision, shoulder checking while driving, sports, lifting, working overhead, falls, sneezing, and coughing.

“Most cases of extracranial vertebral arterial dissection are thought to occur spontaneously, and other factors such as connective tissue disorders, migraine, hypertension, infection, levels of plasma homocysteine, vessel abnormalities, atherosclerosis, central venous catheterization, cervical spine surgery, cervical percutaneous nerve blocks, radiation therapy and diagnostic cerebral angiography have been identified as possible risk factors.”

“The true incidence of vertebrobasilar dissection is unknown, since many cases are probably asymptomatic, or the dissection produces mild symptoms.”

There is a 2001 study claiming that for those aged <45 years, cases were 5 times more likely than controls to have visited a chiropractor within 1 week of VBA stroke. There is a 2003 study claiming that patients with vertebral artery dissection were six times more likely to have consulted a chiropractor within 30 days before than the controls.

**[Important: this study seeks to answer: Did the chiropractic manipulation cause the stroke? OR Did the patient have a spontaneous dissection, causing neck/head symptoms, and seeking chiropractic care?]**

“Because patients with vertebrobasilar artery dissection commonly present with headache and neck pain, it is possible that patients seek chiropractic care for these symptoms and that the subsequent VBA stroke occurs spontaneously, implying that the association between chiropractic care and VBA stroke is not causal.”

“Since patients also seek medical care for headache and neck pain, any association between primary care physician (PCP) visits and VBA stroke could be attributed to seeking care for the symptoms of vertebral artery dissection.”

The purpose of this study is to investigate the association between chiropractic care and VBA stroke and compare it to the association between recent PCP care and VBA stroke. “Evidence that chiropractic care increases the risk of VBA stroke would be present if the measured association between chiropractic visits and VBA stroke exceeds the association between PCP visits and VBA strokes.”

## RESULTS

For those under 45 years of age, there was an increased association between chiropractic visits and VBA stroke.

For those 45 years of age and older, there was no association between chiropractic visits and VBA stroke. **[Important]**

Each chiropractic visit in the month before was associated with an increased risk of VBA stroke in those under 45 years of age by 37%.

Visiting a PCP in the month before the index date was associated with an increased risk of VBA stroke.

"Each PCP visit in the month before the stroke was associated with an increased risk of VBA stroke both in those under 45 years of age [Increased risk by 34%] and 45 years and older [Increased risk by 52%]."

## DISCUSSION

"Patients with head and neck pain due to vertebral artery dissection seek care for these symptoms, which precede more than 80% of VBA strokes." **[Key Point]**

"Since it is unlikely that PCPs cause stroke while caring for these patients, we can assume that the observed association between recent PCP care and VBA stroke represents the background risk associated with patients seeking care for dissection-related symptoms leading to VBA stroke. Because the association between chiropractic visits and VBA stroke is not greater than the association between PCP visits and VBA stroke, there is no excess risk of VBA stroke from chiropractic care." **[Key Point]**

Neck manipulation "is unlikely to be a major cause" of these rare VBA stroke events.

"Our results suggest that the association between chiropractic care and VBA stroke found in previous studies is likely explained by presenting symptoms attributable to vertebral artery dissection."

"It might also be possible that chiropractic manipulation, or even simple range of motion examination by any practitioner, could result in a thromboembolic event in a patient with a pre-existing vertebral dissection."

"There is no acceptable screening procedure to identify patients with neck pain at risk of VBA stroke." **[Key Point]**

## CONCLUSION

“Our population-based case-control and case-crossover study shows an association between chiropractic visits and VBA strokes. However, we found a similar association between primary care physician visits and VBA stroke. This suggests that patients with undiagnosed vertebral artery dissection are seeking clinical care for headache and neck pain before having a VBA stroke.”

#### KEY POINTS FROM AUTHORS

- 1) “Vertebrobasilar artery stroke is a rare event in the population.”
- 2) “There is an association between vertebrobasilar artery stroke and chiropractic visits in those under 45 years of age.”
- 3) “There is also an association between vertebrobasilar artery stroke and use of primary care physician visits in all age groups.”
- 4) “We found no evidence of excess risk of VBA stroke associated chiropractic care.”
- 5) “The increased risks of vertebrobasilar artery stroke associated with chiropractic and physician visits is likely explained by patients with vertebrobasilar dissection-related neck pain and headache consulting both chiropractors and primary care physicians before their VBA stroke.”

#### KEY POINTS FROM DAN MURPHY

- 1) “Neck pain and headache are common symptoms of VBA dissection, which commonly precedes VBA stroke.”
- 2) “VBA stroke is a very rare event in the population.”
- 3) “The increased risks of VBA stroke associated with chiropractic and PCP visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke.”
- 4) There is “no evidence of excess risk of VBA stroke associated chiropractic care compared to primary care.”
- 5) With respects to neck manipulation and vertebral artery dissection, “the prevailing theory is that extension and/or rotation of the neck can damage the vertebral artery, particularly within the foramen transversarium at the C1-C2 level.”
- 6) Activities leading to sudden or sustained rotation and extension of the neck that have been implicated in vertebral artery dissection, included motor vehicle collision, shoulder checking while driving, sports, lifting, working overhead, falls, sneezing, and coughing.

- 7) Most cases of vertebral arterial dissection occur spontaneously.
- 8) Risk factors for VAD include connective tissue disorders, migraine, and hypertension.
- 9) "The true incidence of vertebrobasilar dissection is unknown, since many cases are probably asymptomatic, or the dissection produces mild symptoms."
- 10) "Because patients with vertebrobasilar artery dissection commonly present with headache and neck pain, it is possible that patients seek chiropractic care for these symptoms and that the subsequent VBA stroke occurs spontaneously, implying that the association between chiropractic care and VBA stroke is not causal."
- 11) In this study:
  - A)) For those under 45 years of age, there was an increased association between chiropractic visits and VBA stroke.
  - B)) For those 45 years of age and older, there was no association between chiropractic visits and VBA stroke. **[Important]**
  - C)) Each chiropractic visit in the month before was associated with an increased risk of VBA stroke in those under 45 years of age by 37%.
  - D)) Visiting a PCP in the month before the index date was associated with an increased risk of VBA stroke.
  - E)) "Each PCP visit in the month before the stroke was associated with an increased risk of VBA stroke both in those under 45 years of age [Increased risk by 34%] and 45 years and older [Increased risk by 52%]."
- 12) "Patients with head and neck pain due to vertebral artery dissection seek care for these symptoms, which precede more than 80% of VBA strokes." **[Key Point]**
- 13) "Since it is unlikely that PCPs cause stroke while caring for these patients, we can assume that the observed association between recent PCP care and VBA stroke represents the background risk associated with patients seeking care for dissection-related symptoms leading to VBA stroke. Because the association between chiropractic visits and VBA stroke is not greater than the association between PCP visits and VBA stroke, there is no excess risk of VBA stroke from chiropractic care." **[Key Point]**
- 14) Neck manipulation "is unlikely to be a major cause" of these rare VBA stroke events.

15) "Our results suggest that the association between chiropractic care and VBA stroke found in previous studies is likely explained by presenting symptoms attributable to vertebral artery dissection."

16) "It might also be possible that chiropractic manipulation, or even simple range of motion examination by any practitioner, could result in a thromboembolic event in a patient with a pre-existing vertebral dissection."

17) "There is no acceptable screening procedure to identify patients with neck pain at risk of VBA stroke." **[Key Point]**

18) "Our population-based case-control and case-crossover study shows an association between chiropractic visits and VBA strokes. However, we found a similar association between primary care physician visits and VBA stroke. This suggests that patients with undiagnosed vertebral artery dissection are seeking clinical care for headache and neck pain before having a VBA stroke."

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