A Population-Based Case-Series of Ontario Patients Who Develop a Vertebrobasilar Artery Stroke After Seeing a Chiropractor

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Abstract

Purpose: The current evidence suggests that association between chiropractic care and vertebrobasilar artery (VBA) stroke is not causal. Rather, recent epidemiological studies suggest that it is coincidental and reflects the natural history of the disorder. Because neck pain and headaches are symptoms that commonly precede the onset of a VBA stroke, these patients might seek chiropractic care while their stroke is in evolution. However, very little is known about the characteristics of these patients. In fact, only small clinical case series and physician surveys have described the characteristics of chiropractic patients who later develop a VBA stroke. To date, no population-based study has described this group of patients. Therefore, the objective of our study is to describe the characteristics of Ontario VBA stroke patients who consulted a chiropractor within the year before their stroke.

Methods: We conducted a population-based case series using administrative health care records of all Ontario residents hospitalized with VBA stroke between April 1, 1993, and March 31, 2002. Three databases were deterministically linked to extract the relevant information. We describe the demographic, health care utilization, and comorbidities of VBA patients.

Results: Ninety-three VBA stroke cases consulted a chiropractor during the year before their stroke. The mean age was 57.6 years (SD, 16.1), and 50% were female. Most cases had consulted a medical doctor during the year before their stroke, and 75.3% of patients had at least one cerebrovascular comorbidity. The 3 most common comorbidities were neck pain and headache (prevalence, 66.7%; 95% confidence interval [CI], 57.0%-76.3%), diseases of the circulatory system (prevalence, 63.4%; 95% CI, 54.8%-74.2%), and diseases of the nervous system and sense organs (prevalence, 47.3%; 95% CI, 38.7%-58.1%).

Conclusions: Our population-based analysis suggests that VBA stroke patients who consulted a chiropractor the year before their stroke are older than previously documented in clinical case series. We did not find that women were more commonly affected than men. Moreover, we found that most patients had at least one cardio- or cerebrovascular comorbidity. Our analysis suggests that relying on case series or surveys of health care professionals may provide a biased view of who develops a VBA stroke. (J Manipulative Physiol Ther 2011;34:15-22)

Key Indexing Terms: *Vertebral Artery Dissection; Chiropractic; Population Characteristics*

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Vertebrobasilar artery (VBA) stroke is a rare neurological condition[1,2] that is associated with a poor outcome in 8% of cases.[1] In Canada, the incidence rate of VBA stroke varies from 0.750 per 100 000 person-years in Ontario to 0.855 per 100 000 person-years in Saskatchewan.[2] The early clinical presentation of VBA stroke typically includes neck pain and headache with or without neurological signs and symptoms.[1]

It is common for patients with neck pain and headache to seek care from chiropractors. In North America, approximately 12% of adults seek chiropractic care each year[3]; and about 28% of these patients seek care for neck pain and headaches.[4] Patients who seek care from a chiropractor are, on average, more likely to be young, have a higher income, be more physically active, and have fewer chronic health conditions than individuals who do not consult chiropractors.[3]

Chiropractic manipulation of the cervical spine has been hypothesized to cause VBA strokes. This association has been investigated in 4 epidemiological studies on the risk of VBA stroke following chiropractic care. The first study by Rothwell et al found that patients younger than 45 years of age were 5 times more likely to have visited a chiropractor within 1 week of their VBA.[5] Similarly, a study by Smith et al[6] reported that VBA stroke patients were approximately 6 times more likely than controls to have received a cervical spine manipulation within 30 days of their stroke. More recently, a population-based case-crossover study found that individuals who visited a physician before their stroke had a similar risk of VBA stroke as those who visited a chiropractor.[7] This study suggests that patients seek care for early symptoms of an evolving stroke (neck pain and headache) and that the chiropractic care does not increase the risk of VBA stroke. Finally, an ecological study by Boyle et al[2] found that, at the population level, the utilization of chiropractic care is not associated with fluctuations in the incidence of VBA stroke.

The characteristics of chiropractic patients who suffer from a VBA stroke are not well described. We searched Medline to identify studies that describe these patients and found 3 case series[8-10] and 3 physician surveys[11-13] (Table 1). These studies have led to the belief that VBA stroke patients who have consulted a chiropractor before their stroke are younger than 40 years, are female, and seldom have risk factors for cardiovascular and/or cerebrovascular disease[8-13] (Table 1). However, case series and surveys are liable to selection and information bias and therefore cannot be used to make valid inferences about the characteristics of individuals with VBA stroke. In addition, these studies are descriptive; and there is no control group to calculate the relative risk. Therefore, clinical case series cannot be used to make valid inferences about the characteristics of individuals with VBA stroke.

The primary objective of our study is to describe the demographics, past health care utilization, and comorbidities of Ontario VBA stroke patients who consulted a chiropractor within the year before their stroke. We wish to emphasize that our analysis is purely descriptive in nature; it cannot be used to make causal inferences about the etiology of VBA stroke. However, understanding who develops a VBA stroke is an important first step in identifying patients who may be at risk of developing a VBA stroke.

Methods

Study Design

We conducted a population-based case series of patients who were hospitalized with VBA stoke between April 1, 1993, and March 31, 2002. The study was approved by the University Health Network Review Ethics Board (10-04220AE). These cases are the same cases in the case-crossover study previously reported by Cassidy et al.[7]

Source Population and Acute VBA Stroke Cases

The source population included all Ontario residents covered by the provincial universal health care system, the Ontario Health Insurance Plan (OHIP). Members of the armed forced, federal inmates, and the Royal Canadian Mounted Police, who are not covered by OHIP, were not included in this study.

All acute incident VBA strokes cases (*International Classification of Diseases, Ninth Revision, Clinical Modification* [*ICD-9-CM*]: 433.0 and 433.2) presenting to Ontario hospitals between April 1, 1993, to March 31, 2002, were eligible for analysis. Individuals with a history of stroke (*ICD-9-CM*: 433.0, 433.2, 434, 436, 433.1, 433.3, 433.8, 433.9, 430, 431, 432, and 437.1), transient cerebral ischemia (*ICD-9-CM*: 435), or late effects of cerebrovascular disease (*ICD-9-CM*: 438) before their VBA discharge diagnosis were not considered as incident VBA cases. The admission date to the hospital was assumed to be the date of the stroke. All eligible VBA stroke cases had at least 1 year of OHIP coverage before their stroke.

Data Sources

Three databases were deterministically linked using a study identifier that had no resemblance to the case's personal identifiers. We used the Discharge Abstract Database from the Canadian Institute for Health information to identify eligible incident VBA stroke cases from April 1, 1993, to March 31, 2002. Information on ambulatory and emergency department visits were obtained from the OHIP claim database that contains all eligible claims made by physicians, specialists, and chiropractors under Ontario's universal fee-for-services health care system. All ambulatory records in the OHIP database have a diagnostic code. Diagnostic codes based on the *ICD* and OHIP fee codes[14] from ambulatory records were used