Informed Consent Regarding Risk of Stroke from Cervical Spine Manipulation: A Narrative Review

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ABSTRACT

Objective: Although the incidence of stroke following cervical spine manipulation (CSM) is low, the potential outcomes are serious. The objective of this study was to perform a narrative review to assess whether informed consent to the risk of stroke from CSM is recommended by chiropractic researchers and practice guidelines.

Methods: An electronic literature search was conducted in February 2025 using PubMed, Google Scholar, and the Index to Chiropractic Literature, covering 1989 to March 2025. Search terms included chiropractic, cervical spine manipulation, stroke, informed consent, and risk. English language peer reviewed studies by chiropractic physicians, along with practice guidelines written in whole or in part by chiropractic physicians, were considered.

Results: There was unanimous support for informed consent to the risk of stroke from CSM in the results. We identified two practice guidelines, two case control studies, three narrative reviews, and one case series authored by chiropractic physicians that recommend such informed consent. We did not find any peer reviewed studies that argued against such informed consent.

Conclusions: Informed consent to the risk of stroke from CSM is recommended by practice guidelines and chiropractic researchers. This lends weight to the view that such informed consent is the standard of care for the chiropractic profession.

INTRODUCTION

Plausible thromboembolic and thrombotic mechanisms of causation of immediate stroke from cervical spine manipulation (CSM) have been reported in the literature.[1,2,3] These causal mechanisms are supported by researchers from chiropractic, neurology, and physical therapy. Sudden neck movement from CSM could dislodge a loosely adherent thrombus from an existing cervical artery dissection (CAD). CAD refers to both vertebral artery dissection (VAD) and internal carotid artery dissection. The dislodged thrombus could embolize and occlude an artery that supplies the brain, resulting in thromboembolic ischemic stroke. Alternatively, an already large cervical artery thrombus could be suddenly repositioned by CSM in such a way that it blocks the cervical artery, resulting in thrombotic ischemic stroke from vascular occlusion. Multiple case reports of immediate stroke following CSM are consistent with these causal mechanisms.[4,5,6]

These mechanisms of causation of stroke require that CAD be present prior to CSM, not caused by CSM. Multiple biomechanical studies performed on healthy cadaveric vertebral arteries support that CSM is unlikely to cause CAD.[7,8] Multiple epidemiological studies support that in cases of stroke following CSM, CAD was present prior to the CSM.[9,10,11,12] A literature review found that biomechanical evidence is insufficient to establish the claim that CSM causes VAD and recommended that practitioners should strongly consider VAD as a presenting symptom. A systematic review and meta-analysis concluded that there is no convincing evidence that CSM can cause CAD.[13] There are no randomized controlled trials on this topic because they would be either unethical and/or infeasible due to the rarity and life-threatening nature of CAD and stroke.[14]

The incidence of CAD has been estimated at 8.93 per 100,000 people per year.[15] In the USA with a population of 330 million, this equates to 29,469 cases per year. The most common symptoms of CAD are neck pain and/or headache. It is plausible that neck pain and/or headache from undiagnosed CAD may be causing hundreds or thousands of these people to seek chiropractic care.

While some chiropractors argue CSM's stroke risk is overstated,[16] others advocate caution due to severe potential outcomes.[1] Given that CSM performed in the presence of CAD can potentially lead to serious outcomes like paralysis or even death due to stroke, it is crucial to examine the chiropractic literature to see how informed consent regarding this risk is addressed.

OBJECTIVE

The objective of this narrative review[17] was to assess whether informed consent for the risk of stroke from CSM is recommended by chiropractic researchers and practice guidelines by reviewing pertinent literature.

METHODS

An electronic search was performed of PubMed, Google Scholar, and the Index to Chiropractic Literature from 1989 to March 2025. 1989 was the year in which plausible mechanisms by which CSM could cause stroke first appeared in the literature.[1,18]

The following search terms were utilized: chiropractic, cervical spine manipulation, stroke, informed consent, risk. Two authors independently screened titles and abstracts, including English-language peer-reviewed studies or practice guidelines authored wholly or partly by chiropractic physicians, with discrepancies resolved by consensus. For this review, "practice guideline" refers to a formal document developed by a professional organization, association, or expert consensus group, intended to provide evidence-based recommendations to standardize clinical practice.

The standard of care in any healthcare profession is traditionally defined by professionals within that field. Therefore, this review exclusively included papers authored in whole or in part by chiropractic physicians. This approach aligns with medicolegal standards, which typically permit only members of a respective profession to provide opinions on what constitutes the standard of care for that profession.

RESULTS

There was unanimous support for informed consent to the risk of stroke from CSM in the results. Our literature search yielded two practice guidelines, two case control studies, three narrative reviews, and one case series recommending such informed consent. (**Table 1**) We did not find any peer reviewed studies that argued against such informed consent.

The 2020 Rushton et al. document is a multi-disciplinary publication of the physical therapy, chiropractic, and osteopathic professions.[19] It was co-authored by chiropractic physician Dr. Sidney Rubinstein. The 2014 Biller et al. study was co-authored by chiropractic physician Dr. Preston Long. Therefore, both studies met our search criteria.

Table 1: Results of Literature Search

Year	Study	Author(s)	Design	Publisher	Type of Informed Consent
1991	Standards of practice relative to complications of & contraindications to spinal manipulative therapy[20]	Gatterman	Narrative Review	Journal of the Canadian Chiropractic Association	Verbal and written informed consent

2002	Unpredictability of cerebrovascular ischemia associated with cervical spine manipulation therapy[21]	Haldeman et al.	Case Series	Spine	Informed consent (verbal and/or written not specified)
2007	Association of Chiropractic Colleges Informed Consent Guideline[22]	Association of Chiropractic Colleges	Practice Guideline	Association of Chiropractic Colleges	Informed consent (verbal and/or written not specified)
2008	Should the chiropractic profession embrace the doctrine of informed consent?[23]	Lehman et al.	Narrative Review	Journal of Chiropractic Medicine	Verbal and written informed consent
2008	Risk of vertebrobasilar stroke & chiropractic care[9]	Cassidy et al.	Case Control	Spine	Patient preference in treatment
2014	Cervical Arterial Dissections & Association With Cervical Manipulative Therapy[24]	Biller et al.	Narrative Review	Stroke	Informed consent (verbal and/or written not specified)
2015	Chiropractic care & the risk of vertebrobasilar stroke[10]	Kosloff et al.	Case Control	Chiropractic & Manual Therapies	Respect individual patient values
2020	International IFOMPT Cervical Framework[19]	Rushton et al.	Practice Guideline	International Federation of Orthopaedic Manipulative Physical Therapists	Verbal or written informed consent

Notable Exclusion

A 2010 Declaratory Ruling Memorandum of Decision by the State of Connecticut Board of Chiropractic Examiners concluded that chiropractors are not required to address stroke as a part of securing informed consent by patients to CSM.[25] This regulatory decision was not peer reviewed or a practice guideline, therefore it was excluded.

DISCUSSION

Gatterman (1991)

Gatterman recommended verbal and written informed consent to the risk of stroke and serious neurological damage as a result of CSM.[20] She proposed the use of an informed consent document developed by the Centre for the Study of Spinal Health at Canadian Memorial Chiropractic College.

Haldeman et al. (2002)

Haldeman et al. conducted a retrospective review of 64 unpublished medicolegal cases of stroke following CSM.[21] The study found no consistent patient characteristics or risk factors - such as age, gender, migraines, or hypertension - that could predict these events. Most incidents occurred rapidly (63% immediately, 94% within 48 hours), predominantly linked to vertebrobasilar artery dissection, with outcomes ranging from full recovery (18%) to significant residuals like coordination loss (50%) or death (3%).

The authors concluded that these strokes are "unpredictable" and "inherent" to CSM, labeling them idiosyncratic complications. They explicitly recommended that physicians inform patients of this risk, suggesting a discussion that weighs it against alternatives like NSAIDs or surgery. This stance supports verbal or written informed consent, emphasizing patient autonomy in light of an unpreventable yet serious potential outcome.

The Association of Chiropractic Colleges (2007)

The Association of Chiropractic Colleges (ACC) recommended[22] that in deciding what information the doctor should convey to a patient concerning risks involved in a particular procedure or care, the doctor must take into consideration both:

1. The potential severity of the injury or adverse consequences that may result.
2. The likelihood that injury or consequence will occur.

The ACC recognized that no physician must disclose every single conceivable risk of a proposed procedure, regardless of how remote that risk of injury might be. However, if a certain risk is a mere possibility which ordinarily need not be disclosed, yet if its occurrence carries serious consequences, such as stroke, paralysis, or death, it should be regarded as a material risk requiring disclosure. Although this recommendation is no longer visible on the ACC website, it has not been rescinded by the ACC.

Lehman et al. (2008)

Lehman et al. recommended informed consent to the risks of chiropractic treatment, such as the risk of stroke from CSM.[23] The authors reference a Connecticut malpractice case where the patient stated that if she knew there was a possibility of a stroke with CSM, she would not have consented to the treatment.[26] The authors recommended:

1. A written statement of informed consent to the risk of stroke from CSM signed by the patient.
2. The written statement of informed consent to the risk of stroke from CSM also signed by the doctor.
3. A doctor/patient discussion of informed consent to the risk of stroke from CSM documented in the patient's chart. Patients may sign forms that they may not have read and understood completely, hence the necessity for the physician/patient discussion.

Cassidy et al. (2008)

Cassidy et al. concluded that the association between chiropractic care and vertebrobasilar (VBA) stroke was likely due to pre-existing VAD prior to CSM, with the neck pain and/or headache from VAD causing the patient to seek chiropractic care.[9] They also observed that CSM could result in a thromboembolic event in a patient with existing VAD. Like Haldeman et al.,[21] the authors opined that there was no acceptable screening procedure to identify neck pain patients at risk of VBA stroke.

Given this potentially life-threatening clinical setting, the authors recommended that the treatment of patients with neck pain and/or headache should be driven by patient preference. This emphasis on patient preference implies a need for informed decision-making, supporting the relevance of discussing potential risks like stroke with patients. This is consistent with the authors' admission that they had not ruled out CSM as a potential cause of some VBA strokes.

Biller et al. (2014)

Biller et al. concluded that patients with neck pain from VAD may present to chiropractors for treatment and it is plausible that CSM could exacerbate the VAD and increase the risk of stroke.[24] Therefore, patients with neck pain and without neurological symptoms after trauma should be informed about the potential risks of receiving CSM, and chiropractors should carefully consider the possibility of CAD as a presenting symptom prior to performing CSM.

Kosloff et al. (2015)

Kosloff et al. examined the link between chiropractic care and VBA stroke. They found an association between chiropractic DC visits and VBA stroke but did not consider it significant. The authors concluded that the significant association found in other case control studies[9,27,28] was likely from patient decisions to seek care for neck pain and headache due to pre-existing VAD.

The authors recommended that clinical practice be guided by evidence of cervical manipulation's effectiveness, plausible treatment options (such as non-thrust manual techniques), and individual patient values. This focus on integrating evidence and options with patient values implies a need for shared decision-making, highlighting the importance of discussing potential risks like stroke with patients. This resonates with the authors noting

that their study does not exclude CSM as a possible cause or contributory factor in VBA stroke.

The IFOMPT Cervical Framework (2020)

The International Framework for Examination of the Cervical Region for potential of vascular pathologies of the neck prior to Orthopaedic Manual Therapy Intervention, also known as the International IFOMPT Cervical Framework, was published by the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT).[19] In this multi-disciplinary document, the authors recommended that informed consent to the risks of CSM be obtained explicitly either verbally or in writing and that it be recorded in a standardized manner.

Proposed statement of informed consent

Our search did not find any statement of informed consent to the risk of stroke from CSM which reflects the research in this area. We offer an example informed consent statement reflecting available evidence, intended as a discussion starter rather than a definitive recommendation:

"I understand and am informed that there is a risk of stroke from neck manipulation performed in the presence of an arterial dissection. An arterial dissection is a tear in the inner lining of an artery which heals with a blood clot.[29,30] There is no convincing evidence that neck manipulation can cause dissection in healthy arteries.[13] However, an existing dissection may be aggravated by neck manipulation.[1] If a loosely adherent blood clot is dislodged by neck manipulation, it could travel to the brain and cause a stroke.[31] If a large blood clot is suddenly repositioned, it could block blood flow to the brain and cause a stroke.[18] I understand the physician will perform a thorough history and examination to determine if I may have a dissection. If a dissection is suspected, I will be referred to medical emergency for further evaluation."[32]

Suggestions for future research

Our proposed statement of informed consent has not undergone pilot testing for patient understanding. Future research in this area is essential before utilizing this or a similar proposed statement.

Multiple chiropractic-authored sources recommend informed consent for the risk of stroke associated with CSM, however this view is not uniform across the profession. Some researchers have stated that chiropractic care is not a risk factor for vertebrobasilar stroke.[16] This variability prompts questions: What factors contribute to the ongoing debate and lack of consensus on this practice? Are there educational, cultural, or historical influences or biases shaping chiropractors' approaches to risk disclosure? Exploring these differences lies beyond the scope of this review, but their presence highlights the value of future research to better understand and address the profession's diverse perspectives.

Our search did not yield any systematic literature reviews. Presumably, no systematic reviews on this topic appear to have been published. It is our hope that this initial narrative review will spur other researchers to perform more comprehensive reviews.

LIMITATIONS

This is a narrative review, rather than a systematic review. Article screening and data extraction was done by only two authors so it is possible that relevant articles may have been missed, or that there may have been errors in extraction.

CONCLUSION

We conclude that informed consent for the risk of stroke from CSM is recommended by chiropractic researchers and practice guidelines, with no peer-reviewed studies opposing this stance. The literature supports providing patients with information about this rare but serious risk, reflecting the chiropractic profession's standard of care equipping individuals to make informed choices about their treatment. These findings, drawn from authoritative sources within the field, highlight the importance of clear risk communication to support patient decision-making, lending weight to its role as a professional norm.

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