

Letter to the editor: Cervical spine manipulation therapy, arterial dissection, and the law: Informed consent and causation in Goldie C. Arsenault

Editor,

I read with interest the paper by Pierre Boucher, *Cervical Spine Manipulation Therapy, Arterial Dissection, and the Law: Informed Consent and Causation in Goldie C. Arsenault*.¹ While I applaud the effort of his causation analysis, the author could have evaluated causation of the dissection and the stroke simply by applying the 3-step causal analysis proposed by Freeman et al.² Courts have endorsed the 3-step causal methodology as the generally accepted approach for injury causation.³

3-Step Analysis of Causation of Right Internal Carotid Artery Dissection:

1. Plausibility. It is plausible that cervical spine manipulation (CSM), like any neck movement, could cause right internal carotid artery dissection (ICAD) in a patient susceptible to dissection.⁴ The patient's clinical profile included migraine, which is a risk factor for dissection.⁵
2. Temporality. There was not a close temporal association between CSM and the onset of symptoms of dissection. There was no immediate adverse reaction to the CSM. The immediate consequence of dissection caused by CSM would likely be sudden severe cervico-occipital pain, a brief syncope, nausea, vertigo or tinnitus.⁶
3. Lack of a more probable alternative explanation. There is a more probable alternative explanation for the cause of the dissection. In a patient susceptible to dissection, it could occur spontaneously or with any neck movement.

3-Step Analysis of Causation of Stroke:

1. Plausibility. It is plausible that CSM done in the presence of an existing right ICAD could have caused thromboembolic or thrombotic stroke.⁷
2. Temporality. Stroke caused by CSM would likely be immediate, with ischemic symptoms occurring within seconds or minutes.⁷ There was not a close temporal association between CSM and the onset of ischemic symptoms. Ischemic stroke symptoms began on 2/10/13, 23 days after CSM on 1/18/13.
3. Lack of a more probable alternative explanation. There is a more probable alternative explanation for the cause of the stroke in this case. Moving a heavy log on 2/10/13 could have dislodged a

thrombus from an existing right ICAD, causing thromboembolic or thrombotic stroke.


Based on this reasoning, it is not likely that CSM performed on 1/18/13 caused the dissection or the stroke diagnosed on 2/10/13. This 3-step framework complements rather than replaces the epidemiological and biomechanical literature which Boucher reviews.

Declaration of competing interest

The author declares the following financial interests/personal relationships which may be considered as potential competing interests: The author provides consultation on medicolegal matters including cervical artery dissection and stroke diagnosed following cervical spine manipulation.

References

1. Boucher P. Cervical spinal manipulative therapy, arterial dissection, and the law: informed consent and causation in goldie C. Arsenault. *J Forensic Legal Med.* Published online March 2026:103116. doi:10.1016/j.jflm.2026.103116.
2. Freeman MD, Rossignol AM, Hand ML. Forensic epidemiology: a systematic approach to probabilistic determinations in disputed matters. *J Forensic Legal Med.* 2008;15(5): 281–290. <https://doi.org/10.1016/j.jflm.2007.12.009>.
3. *Etherton v Owners Insurance Company*. 829 F.3d 1209 (10Th Circuit US Court of Appeals 2016).
4. Tuchin P. Chiropractic and stroke: association or causation? *Int J Clin Pract.* 2013;67(9):825–833. <https://doi.org/10.1111/ijcp.12171>.
5. Daghlas I, Sargurupremraj M, Danning R, et al. Migraine, stroke, and cervical arterial dissection: shared genetics for a triad of brain disorders with vascular involvement. *Neurol Genet.* 2022;8(1), e653. <https://doi.org/10.1212/NXG.0000000000000653>.
6. Hufnagel A, Hammers A, Schönlé PW, Böhm KD, Leonhardt G. Stroke following chiropractic manipulation of the cervical spine. *J Neurol.* 1999;246(8):683–688. <https://doi.org/10.1007/s004150050432>.
7. Brown SP. Plausible mechanisms of causation of immediate stroke by cervical spine manipulation: a narrative review. *Cureus J Med Sci.* 2024;16(3), e56565. <https://doi.org/10.7759/cureus.56565>.

Steven Brown DC, DIAMA^{*} 
University of Bridgeport

^{*} Corresponding author.

E-mail address: brown@brownchiro.com.

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