

# Vertebrobasilar dissection and cervical spine manipulation

## A complex pain in the neck

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Chiropractic adjustment and manipulation are widely used to treat a variety of musculoskeletal complaints. The number of chiropractors in the U.S. is expected to nearly double in this decade,<sup>1</sup> and it is estimated that chiropractic visit rates are at least 100 per 100 person-years in the U.S., with nearly 85% of these involving adjustment or manipulation of the spine.<sup>2</sup> As use of chiropractic treatments has increased, so have demands for scientifically rigorous studies examining the risks and benefits of various chiropractic procedures. Prior to 2002, there were at least three randomized trials of cervical manipulation for patients with acute neck pain. However, the number of patients in these studies was small, and the quality of the studies, as judged by standardized criteria, was low.<sup>3</sup> Recently, a large and well-designed randomized clinical trial showed that cervical manipulation (controlled dynamic thrust applied with high-velocity, low-amplitude force) was no better than mobilization (low velocity, variable amplitude movement applied within the patient's passive range of motion) for acute neck pain.<sup>4</sup>

Although there are many reports of stroke following cervical manipulation, until recently there were few studies that allowed one to confidently estimate the risk of stroke associated with this procedure. Past literature has suggested rates of stroke after cervical manipulation from one in 100,000 to one in 2 million.<sup>1,5,6</sup> The study by Smith et al. in this issue of *Neurology* advances the current boundary of our knowledge in this area by addressing some of the methodologic issues that are fundamental to rigorously assessing the risk of stroke after neck manipulation.<sup>7</sup> The authors identified patients with dissection and vertebrobasilar stroke or TIA from a prospective stroke registry and assigned stroke etiology in a blinded and systematic fashion. They selected controls, matched for age and sex, from the

same stroke registry. To address the issue of chicken and egg, i.e. did patients in fact seek treatment for symptoms of dissection, they also interviewed all subjects to determine the presence and timing of both neck pain and cervical manipulation prior to stroke. Finally, they used multivariate analysis to control for important variables that might impact stroke risk, including age, other stroke risk factors, and neck pain prior to the cervical manipulation. Their finding that chiropractic manipulation independently increased the risk of vertebral artery dissection and stroke or TIA by approximately six-fold must be taken seriously.

However, there are several issues that remain to be addressed before one can confidently estimate the risk of dissection after neck manipulation, and the presence of these lingering issues suggests that requiring consent for all patients undergoing cervical manipulation may be premature. Case control studies are inherently susceptible to bias, especially selection and recall bias, even in well-conducted studies like that of Smith et al. Controls were age-matched, but still were significantly older than dissection cases in their study. Since younger persons are more likely than older persons to have dissection as a cause of stroke,<sup>8</sup> and since younger persons are also more likely to visit a chiropractor,<sup>2,9</sup> age is a possible confound in this analysis (related to both the exposure and the outcome) and may therefore affect the risk estimate in an unpredictable manner. Second, recall bias may influence the subjects' recollection of events around the time of their stroke, and verification of the timing and specific type of manipulation by review of chiropractic records was not done. Other important issues that deserve attention in future case-control or cohort studies include specific patient characteristics that might predict stroke,<sup>10</sup>

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characteristics of the manipulation done (low vs high velocity, rotation vs tilting, number and frequency of treatments),<sup>3</sup> and the time course of neck pain onset, manipulation, and ischemic symptoms.

Since prospective studies to more precisely quantify the risk of stroke after neck manipulation are likely cost-prohibitive, are better risk estimates beyond our grasp? No, but risk estimates for stroke after neck manipulation will always be difficult to quantify since bias in retrospective case-control and cohort studies can significantly impact relative risk estimates, and since confidence intervals around risk estimates are wide when the number of observed events is low. In the Smith et al. study, there were in fact only seven subjects with dissection and cervical manipulation within 1 week of their stroke. Even if risk estimates are better quantified, however, the fundamental issue remains not consent for risk but demonstration of benefit: in the absence of randomized controlled trial evidence demonstrating the efficacy of cervical manipulation, the best current evidence suggests that the small risk of dissection and stroke outweighs the benefit of this treatment modality for patients with acute neck pain.

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