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Spinal Manipulation: Important New Data on Risks

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The art and science of chiropractic have rather remarkably survived, despite countless organized attacks in the last century from factions bent on "draining the swamp" of alternative medicine. Currently in vogue are the dire warnings and exhortations against cervical spine manipulation, out of fear of stroke or other complications. The current round of invective has blazed through the media, inveigling many in the medical profession into accepting this new danger at face value. Sadly, the medical profession is not unlike the chiropractic profession: Both have the enviable facility of swallowing their own propaganda.

You may have read recently a report out of Canada contends one of every 20,000 chiropractic manipulative therapeutic (CMT) interventions results in a stroke or other serious injury. Is this possible? Having served as expert witnesses in many dozens of medical malpractice cases over the last 20 years, it is clear to us that CMT is clearly not without an element of risk. To many, this is an uncomfortable truth, but rather than fighting chiropractic's detractors with tangential accusations using the oft-quoted statistics of the incidence of deaths caused by errors in medicine, it is first appropriate to set the record straight in terms of the accusations leveled against chiropractic. Jingoism, after all, does not guarantee strategic good sense.

CMT Complications in Tulsa, Oklahoma, Over a Five-Year Period

In this article, we will mention two recent papers which may interest those feeling besieged by recent attacks. The first is a paper by Malone, et al.,¹ which can be downloaded at www.neurosurgery.org/focus/. The journal, *Neurosurgical Focus*, is a publication of the *Journal of Neurosurgery* and the American Association of Neurological Surgeons. The authors are members of a group neurosurgical practice in Tulsa, Okla., who collected a series of 22 cases of purported complication from cervical spinal manipulation over a five-year period (1993-1998). Each case is presented in brief detail in their paper. The authors then estimated the risk based, apparently, on the estimated number of manipulations delivered in that region and reported it to be one "irreversible" complication for every 45,600 cervical manipulations which, they added,

does not take into account that their group represents only a third of the neurosurgeons in the region. They did not mention the fact that orthopaedic surgeons might also handle some of these cases.

The lesions identified in the series of cases presented were radiculopathy (21 cases); myelopathy (11 cases); partial Brown-Séquard syndrome (two cases); and vertebral artery occlusion (one case). Twenty-one patients underwent surgery. Poor outcomes were observed in three; in one it was unchanged; and 17 improved (inexplicably summing to only 21). Both cases of partial Brown-Séquard syndrome resolved. It should be noted that the vertebral artery occlusion was not a vascular injury, but a dynamic compression of the artery resulting from a bulging disc during head-turning. This condition also resolved completely. The authors concluded that the rates of complication from cervical spine manipulation may be higher than previously reported, citing a chapter in a textbook by Scott Haldeman, DC, PhD, MD (*Principles and Practice of Chiropractic*, 1992, pg 552). That chapter included the results of a Swiss survey of manual therapy practitioners - all of whom were medical doctors - that reported a minor complication rate of one in 41,500 manipulations, and severe neurological complications at a rate of one in 383,750 manipulations.

In reviewing the case reports in the Malone, et al., paper, it should be noted that three were treated by an osteopath and two were treated by both an osteopath and a chiropractor. Apparently, all 22 cases were reported as "irreversible," to distinguish them from instances of minor aggravations of various conditions that did not require any surgical intervention. Since all but four of these patients recovered following surgery, it might be viewed as something of a misnomer to classify them as "irreversible." Surgery, after all, should be considered the last resort in the approach to spinal disorders, since the consequences of fusing a segment in the cervical spine include new cases of radiculopathy and myelopathy at adjacent segments in as many as 25% of cases over the ensuing decade,² and later degeneration at adjacent segments in up to 50% of cases.³ This says nothing of the potential risks of general anesthesia and other postoperative complications that are substantially higher than the risks for spinal manipulation.

Thus, in a reasonable and cost-effective approach to spinal conditions, noninvasive methods, such as CMT, are the first line of attack. When CMT fails, surgery is usually available as the last resort. The question then is, how many of these patients would have eventually ended up in surgery even without the chiropractic or osteopathic interventions. An even better question, and one not addressed by the retrospective study design employed in this study, is how many patients who underwent CMT during that five-year period avoided

surgery because of it?

One of us (Dr. Croft) has been involved in many dozens of medical malpractice cases in which chiropractors have been sued when complications such as those described in this paper arose. It seems there is not much doubt that CMT may have hastened the inevitable, in some cases. In some, it may have altered the natural history of the disc disease in ways that might otherwise have been avoidable. In other cases, the chiropractor is caught in the net, merely as a result of this natural history, often taking on the patient with an existing herniation. When symptoms increase over time, another provider is brought in; he or she orders an MRI disclosing the lesion; and fingers begin to point. Importuning comments made by other practitioners, nurses, therapists, etc., imply the CMT caused this lesion, and a lawsuit is instigated. The fog of war intervenes, and the facts become increasingly murky as legal strategies evolve. Here is one reason why we always tell students that when it comes to imaging studies, chiropractors have a need-to-know that is equivalent to surgeons, and greater than those treating medically.

A collateral question is whether chiropractors should even manipulate a known or suspected segment; plaintiff's experts often testify that chiropractors are taught to refer such cases out to other practitioners. This issue defines the so-called "standard of care in the community," which is a pivotal issue in such lawsuits. It defines what a reasonable and prudent chiropractor would have done under the circumstances - not necessarily what the optimal approach would have been. If a plaintiff's attorney can show that the chiropractor's management fell below this standard of care, the stage is set for a malpractice suit. Of course, damages and a cause-and-effect relationship between them and the management also will have to be proved. That means that even if the manipulation did worsen the disc condition, if the procedure was undertaken within this standard of care (and with adequate informed consent), the malpractice claim will be difficult to make. Unfortunately, this standard of care is often poorly defined, and sometimes it is downright nebulous, forcing jurors to decide which expert's opinions to accept. A classic example involves the case of whether it is prudent to manipulate a disc lesion. This question was answered definitively using a questionnaire sent to 52,000 licensed chiropractors. The majority (93%) endorsed the practice of manipulating known or suspected disc herniations in the cervical spine.⁴ (Note: This says nothing of the efficacy or safety of this form of treatment; it merely defines the standard of care for chiropractors.)

Thus, in a study such as the one by Malone, et al., it is important to know the factual details so valid cause-and-effect attributions can be made. Lawsuits naturally produce tendentious biases on the part of plaintiffs, who may be further schooled by their attorneys. Most of the reports in the Malone, et al., paper

seem closely related temporally, but some are less clear. However, leaving aside these cause-and-effect questions, the critical question we have in reading this study is how the authors developed their risk figures. They did not report the source of their data used in determining the number of manipulations given by the chiropractors and other therapists practicing spinal manipulation in the catchment area they serve in Tulsa. They also did not provide us with raw data for the denominator of the risk equation: the estimated total number of spinal manipulations delivered by spinal manipulation practitioners in the Tulsa area between 1993 and 1998. It also is likely that individuals suffering from serious adverse reactions in suburban and rural areas outside of Tulsa would be seen by this group, making the denominator somewhat larger.

Leaving aside the question of whether the risk for complication from cervical spine manipulation is higher for osteopaths and other practitioners using this method of care based on the relative training, since chiropractors deliver 94% of all spinal manipulation in the U.S.,⁵ we re-estimated this risk for cervical spine manipulation by taking the numerator as 22 serious events and multiplying by three (i.e., assuming for the moment that the authors' comments that they represented only a third of the neurosurgeons serving the area are accurate, and assuming the others were equally as likely to treat patients with similar disorders). The denominator can be derived by multiplying the number of licensed practicing chiropractors in the Tulsa region during the period of the study by the number of patients seen per week and the number of weeks worked per year (assuming that in 75% of these cases, a cervical manipulation is delivered. Note: We are considering only one cervical manipulation per office visit, even though more than one manipulation to the cervical spine occurs in most cases on a single office visit.) We can use the figures given by the 2000 American Chiropractic Association Statistical Survey, which reported that the average number of visits per week is 115. For a 50-week year, the number of cervical CMT delivered per physician would be approximately 4,312. This number is multiplied by five years for the duration of the study period.

We determined the number of licensed and active chiropractors serving the Tulsa community during this same time period by consulting the records of the Oklahoma State Board of Chiropractic Examiners. This number was 230.

This puts the risk at one serious complication per 75,133 cervical-spine CMTs. Note also that this rather conservatively assumes that none of these cases would have become surgical, absent the chiropractic intervention, which is, of course, unlikely. Thus, because the Swiss survey was completed by nonchiropractic physicians with less formal training in cervical spine manipulation, the comparison of the two risk figures (1:41,500 vs. 1:75,133) suggests that there may be greater overall safety of the procedure in

more qualified hands. Meanwhile, Malone, et al., may have overstated the risk by 81%. Of these 22 patients, only 19 were manipulated solely by a chiropractor, making the chiropractic-as-manipulator-only risk one in 86,996 cervical manipulations. Considering only four of these 22 patients had either no change in their condition or a poor recovery - a more orthodox definition of "irreversible" effects - the risk could be stated as one severe, irreversible complication in 413,233 cervical manipulations given by chiropractors in the Tulsa region during this five-year period. However, we caution readers that the numerator in these equations represents more tenuous estimates than does the denominator.

The authors noted in their discussion section that conservative methods of treating cervical disc disease (without manipulation) have been reported to be 80% successful, tacitly suggesting that chiropractic CMT is unnecessary, in most cases. Notwithstanding the fact that chiropractors treat patients for many conditions other than disc degeneration, the papers cited by the authors in support of this comment did not look at overall efficacy or long-term outcomes. However, herein lies the *leitmotif* of the typical strategy applied in the deprecation of CMT. It is marginalized as an option; a discretionary form of therapy. As such, even a remote risk would seem unjustified.

A more meaningful approach would be to compare apples to apples, as has been done in the workers'-compensation arena with low-back disorders. Several excellent studies have demonstrated the advantage of chiropractic care over traditional medical care when it comes to treating low-back injury.⁶⁻⁹ The largest savings often are seen in disability compensation costs, even in cases in which chiropractic care was slightly more expensive than medical care on the basis of doctor's visits alone: in these studies, chiropractors generally got patients back to work sooner, and patients had lower levels of long-term disability. These overall savings to society are best measured by lost time from the workplace and reduced levels of long-term disability. Would such a study of cervical spine pain produce similar findings? We believe the onus is on the chiropractic profession to engage in such efforts, since the currency of acceptance today is scientific research.

Association of Arterial Dissection and CMT

A number of reports in the medical literature have attributed vertebral artery dissection to CMT. The balance of this literature is in the form of single case reports or small series. These reports have served the *a fortiori* thrust of the ongoing repudiation of spinal manipulation. These have been examined in depth by Dr. Allan Terrett of Australia, who disabused some of the myths surrounding this issue.¹⁰ Closer scrutiny of

these reported cases suggests that in many instances, the manipulations were not carried out by chiropractors, while in others, the time between the putative manipulation and the actual dissection was dubiously long, making attribution questionable, particularly in light of the fact that the majority of arterial dissections are idiopathic.

However, before we appear to be monopolizing the ethical high ground, Terrett also points out that in many cases, patients may have walked in to the chiropractic office with an active dissection, the symptoms of which are rather marked unilateral neck pain and headache. The mistake made by the chiropractors in these cases was failure to recognize the lesions as such and to act accordingly in sending the patient out for a vascular work-up prior to instituting care. Generally, the neck pain and headaches are quite unlike any experiences these patients will have had in the past, and that should hoist a grand clinical red flag of suspicion. CMT is clearly contraindicated in these cases of dissection. Although publishing such work as Terrett's in the chiropractic literature is meritorious by reason of that exhortation alone, it is to another degree a bit like preaching to the choir since medical professionals - the ones who generate most of the muzzy literature surrounding CMT and its risks - do not generally read the chiropractic literature.

Recently, an important paper was published in *The Neurologist*, a peer-reviewed and indexed medical journal, which attempted to set the record straight on some of these issues.¹¹ The paper dealt with internal carotid artery dissection (ICAD). The authors found only 12 reports attributing ICAD to either spinal manipulation or chiropractic manipulation. As they pointed out, one of the most oft-cited papers in the literature is that of Beatty (1977; references followed by the year are listed in reference 11), who made the first report. In this case, the patient complained of neck pain before treatment (a symptom of ICAD), but actually reported symptom relief following CMT. Note, however, that there is no plausible physiological explanation as to how CMT could relieve the pain of ICAD, suggesting the patient's real trouble on initial presentation was of a musculoskeletal nature. There was a delay of five days before the onset of true ICAD symptoms. Thus, one of the linchpins of the ongoing controversy regarding the safety of CMT is based on a single case report (offering only class-III evidence) in which the cause-and-effect relationship is unsettled.

One case each was reported by Peters, et al., (1995) and Parenti, et al. (1999). Three cases were reported by Lee, et al. (1995), but it was uncertain as to whether the practitioners were chiropractors. These reports also offer only class-III evidence; moreover, the Lee, et al., paper was a survey only, and participating practitioners were simply asked to rely on their memories, rather than consulting with records or attempting to verify the details of the cases. In all other cases, the practitioners were MDs, PTs, laypersons or

unspecified.

Haneline, et al.,¹¹ also pointed to the fact that violent long-lever manipulation is not taught in U.S. chiropractic schools, which may account for the high number of nonchiropractic cases of injury. They explained that 52% of the typical four-year curriculum at chiropractic college is devoted to spinal manipulation. They used chiropractic statistical databases from the ACA to estimate the number of licensed chiropractors there would have been from the time of Beatty's first paper in 1977 through 2000. Assuming incremental growth from 20,000 to 50,000 practitioners, respectively, and the previous figure of 4,312 cervical CMT or practitioners per year, they estimated that, based on the number of confirmed cases in the literature of ICAD (and it is unlikely that all cases have been reported), the risk of ICAD would have been 0.0000000017 or one in 601,145,000 CMTs. (Note: This figure should not be considered synonymous with the risk for vertebral artery dissection or stroke resulting from that condition.)

This is not the first time we have made a foray into this area. Dr. Croft participated in a RAND study years ago. A panel of medical and chiropractic experts conducted a Delphi study of the existing literature and reported the risk for serious complication from CMT to be an approximate ratio of one to 1,000,000.¹² This was an in-depth, watershed project that, unfortunately, received little attention. That is one reason we wrote this editorial: so the Neurologist paper will not be lost to obscurity. Share it with your medical colleagues and others who are concerned about the risks of CMT as a way of putting things in their proper perspective.

In a world in which we clamor for "best evidence synthesis" and "evidence-based medicine," what we are more often faced with is decision by anecdote or consensus, and "eminence-based medicine" (i.e., research conducted at the more venerated university or published in the more prestigious journal carries more weight). While some chiropractors temporize and cling to dogmatism, or strike back at their detractors with ineffectual tangential innuendo, it seems to us wisest to attack first the attack, then fix the basis of the attack. We accomplish the latter through research.

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