

The safety of manipulative treatment: Review of the literature from 1925 to 1993

DAVID A. VICK, DO
CLAIRE McKAY, DO
CLAIRE R. ZENGERLE, DO

Many osteopathic medical students and physicians have an inherent fear of injuring patients when they perform osteopathic manipulative treatment (OMT). Based on the estimated several hundred million treatments performed each year in the United States as well as a review of the literature over the past six decades, only 185 reports of injury were found. However, besides good training in these techniques, the key to the safety of OMT is the taking of a thorough patient history and performing a thorough physical examination *before* the application of any manipulative procedure.

(Key words: Manipulative treatment, osteopathic manipulative treatment, cerebrovascular accident, manipulative injuries, chiropractor, allied health personnel)

The philosophy, science, and art of healthcare of osteopathic medicine encompasses the prevention, diagnosis, and treatment of disease. When osteopathic medical students begin to learn osteopathic manipulative treatment (OMT) as a tool for diagnosis and treatment, many have an inherent fear of injuring themselves and their partner or patient. This usually unmentioned fear of injury deters students from learning and understanding the true benefits of OMT. As physicians, this fear prevents them from fully practicing the art of osteopathic medicine.

From the Department of Osteopathic Manipulative Medicine, the University of North Texas Health Science Center at Fort Worth—Texas College of Osteopathic Medicine, where Dr Vick is the chairman of the Department of Osteopathic Manipulative Medicine. Dr McKay is a radiology resident at Tulsa Regional Medical Center (Tulsa, Okla), and Dr Zengerle practices family practice medicine at the Cuero Community Hospital Rural Health Clinic (Cuero, Texas).

Correspondence to David A. Vick, DO, FAAO, University of North Texas Health Science Center at Fort Worth—Texas College of Osteopathic Medicine, 3500 Camp Bowie Blvd, Fort Worth, TX 76107-2699.

Incidence of injury

How prevalent is injury from manipulation—including OMT? Numerous articles have been published over the past several decades concerning spinal manipulation injury. Physicians, chiropractors, allied health personnel, and laypersons perform manipulative techniques every day. With so many persons performing manipulation, many procedures are not likely to be documented. Therefore, many signs and symptoms of injury are not reported. This underreporting is especially true of those injuries of a transient or minor nature.

To determine how commonly injuries occur from OMT as well as other types of manipulative treatment, we reviewed the published English language medical literature from the past six decades describing injuries from manipulation. This literature gives a reasonable indication of the magnitude for potential injury from various types of manipulation, although many authors think that such cases are underreported.¹⁻³ A total of 128 articles published from 1925 to 1993 in 15 countries was examined (Table 1). Of these, 98 references reported 185 specific cases of major complications in the cervical, thoracic, and lumbar spine from manipulation, as well as spontaneous trauma or insult.

This review uncovered injuries among 99 men (mean age 41.7 years) and 85 women (mean age 37.5 years). The gender of an additional patient was not identified in the published reports. Of the 185 reported injury cases during the past 68 years, only two osteopathic physicians in the United States were implicated.

Two previous literature reviews by Terrett¹ (1871 to 1988) and Laughlin³ (1975 to 1984) concluded that manipulation by skilled practitioners is a very safe, therapeutic modality. This relative safety depends on the practitioner recognizing the signs and symptoms of vascular or neural embarrassment before performing a manipulative procedure to avoid a potentially debilitating episode.

However, most patients had no reported prior

Table 1
Countries With Reports of Patient Injury After Manipulation*

Country	No. of injuries	Total, %
United States	115	62.0
Australia	17	9.0
Great Britain	13	7.0
Canada	12	6.5
Germany	5	3.0
South Africa	3	2.0
Italy	4	2.0
Finland	2	1.0
New Zealand	1	0.5
Norway	1	0.5
France	1	0.5
Denmark	1	0.5
Spain	1	0.5
Israel	1	0.5
Switzerland	1	0.5

*Compiled from retrospective review of 128 articles.
Bibliography available from Dr Vick.

symptoms of vascular or neural compromise in the literature we reviewed. Many techniques used in the published cases were not disclosed; however, of those cited, most were described as forceful, high-velocity, *extension with rotation techniques*, or manipulation performed with the patient anesthetized. No cases of injury were reported using muscle energy, indirect, or fascial techniques.

The American Osteopathic Association (AOA) does not currently recognize osteopathic physicians trained outside the United States, because they are not fully licensed physicians. Nor does the American Chiropractic Association (ACA) keep information on chiropractors who are trained outside the United States. Of the 185 reported injuries uncovered in this literature, 115 (62%) occurred in the United States.

Of the estimated several hundred million manipulative treatments performed each year, only 185 reports of injury were found in the published literature during the past 68 years. Comparing these figures with the incidence of adverse effects (including death) associated with many pharmaceutical agents, manipulative treatment remains an extremely safe, therapeutic modality when performed by a knowledgeable and skilled practitioner.^{1,3}

Types of injuries

The injuries reported in this retrospective literature review did not reflect minor complications,

Table 2
Types of Patient Injuries Occurring After Manipulation*

Injury	No. patients	Total (%)	No. deaths
Cerebrovascular accidents	123	66.0	26
Disc herniation, rupture, disease	23	12.0	
Bone fracture/dislocation	14	8.0	2
Neural encroachment	12	7.0	1
General increase in pain	6	3.0	
Tumor	3	2.0	
Cardiac arrest	1	0.5	
Tracheal rupture	1	0.5	
Abdominal aorta rupture	1	0.5	
Not mentioned	1	0.5	

*Compiled from retrospective review of 128 articles.
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such as headaches, sprains, or rib fractures. Rather, major complications were reported that were less likely to be transient. Injuries that occurred in patients in the United States were due to cerebrovascular accident (CVA), neural insult, major bone fracture or dislocation, disc disease, and a general increase in patient pain and others. Of the overall reported manipulative injuries, CVA accounts for 66% of them and 90% of the deaths (Table 2). These figures reiterate the importance of being aware of the signs of vascular and neural compromise before—and during—treatment.

Taking a thorough history and performing a physical examination before exerting manipulation is imperative, although many at-risk patients cannot be identified before undergoing treatment.⁴ In 36 of the 185 cases, injury occurred after manipulation was performed by someone other than a DO, chiropractor, or "qualified physician," (for example, a trained allopathic physician). Thus, 20% of the injuries were spontaneous or occurred as the result of an operator who lacked the necessary knowledge and skills to handle potential adverse effects. Spontaneous and accidental injuries included self-rotation or incidental turning of the head; injuries incurred while painting a ceiling or from a fall; and injuries sustained during athletics or exercise.

Cerebrovascular accidents after cervical manipulation

Cerebrovascular accidents were prevalent among patients included in the studies in this retrospective literature review. Yet, the overall subjects' mean age (39.8 years) was younger than that of the typical patient with CVA. Given these findings, a review is in order of the research behind the phenomenon of CVA after cervical manipulation.

One accepted theory behind the cause of CVA is vertebral artery or basilar artery insufficiency. It is manifest by broad symptoms of ataxia, vertigo, nausea, tinnitus, and visual disturbances.⁵ The vertebral arteries are threaded through the cervical foramen transversarium. At the atlas, the vertebral arteries wind around the superior articular processes, then proceed through the foramen magnum to unite with the basilar artery in the pontine cistern. The vertebral artery flow may be affected by cervical osteophytes, tortuosity, contraction/spasm, bony anomalies, or vascular anomalies along its path.^{5,6}

Motion in the upper cervical spine can alter the pattern of these vessels and can cause a significant reduction in blood flow in one or both vertebral arteries during physiologic movements of the cervical spine.³ One significant, common anomaly affecting this area is the asymmetry between the two vertebral arteries that can be found in 10% to 15% of the general population.⁷

Dissections of the vertebral and basilar arteries have also been thought to cause CVA. In their case comparisons of vertebrobasilar ischemia after neck motion, Frisoni and Anzola⁴ concluded that transient rotational obstruction of normal vertebral arteries cannot cause permanent ischemia. They did, however, detect signs of vertebral artery dissection in 82% of the patients. This vertebral artery dissection consisted of string sign, pseudoaneurysm, occlusion, stenosis, intramural hemorrhage, or perforation. Angiography suggested damage, including dissection, around C1-C2 vertebrae in 89% of the patients.

Still, other factors contributing to CVA include vertebral artery terminating in the posterior, inferior cerebellar artery, atherosclerosis, and osteoarthritis.

Comment

Manipulative treatments—including OMT—involve a variety of techniques. Many of these same techniques are used every day by other physicians, chiropractors, allied health personnel, and laypersons. We emphasize this point because so many persons perform manipulation, and many procedures, as well as transient signs and symptoms of injury, go unreported. For osteopathic physicians, this lack of reporting may include complications that occur in the classroom as well as in the clinic.

To reiterate an earlier point, many reported injuries involved using forceful, high-velocity, *extension with rotation techniques*, or manipulation performed with the patient anesthetized. This review of the literature shows that manipulation is safe; however, it is imperative that the operator take a thorough history and perform a physical examination *before* applying manipulative techniques to ensure the health and safety of the patient. In this way, the patient will receive the maximum benefit from OMT and with it the total healthcare experience that helps to define osteopathic medicine.

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