SHORT REPORT

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Deaths after chiropractic: a review of published cases

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Disclosures
None.

SUMMARY

Objective: The aim of this study was to summarise all cases in which chiropractic spinal manipulation was followed by death. **Design:** This study is a systematic review of case reports. **Methods:** Literature searches in four electronic databases with no restrictions of time or language. **Main outcome measure:** Death. **Results:** Twenty six fatalities were published in the medical literature and many more might have remained unpublished. The alleged pathology usually was a vascular accident involving the dissection of a vertebral artery. **Conclusion:** Numerous deaths have occurred after chiropractic manipulations. The risks of this treatment by far outweigh its benefit.

What's known
Chiropractic upper spinal manipulation has repeatedly been associated with arterial dissection followed by stroke and, in some cases, death.

What's new
The article is the first systematic review of all fatalities reported in the medical literature. Twenty-six deaths are on record and many more seem to have remained unpublished.

Vascular accidents after upper spinal manipulation are a well-recognised problem (e.g. 1,2). Dissection of a vertebral artery, caused by extension and rotation of the neck beyond the physiological range of motion, is thought to be the underlying mechanism (2). Several deaths have been reported as a consequence. Some proponents of chiropractic seem to believe that the critical evaluation of this evidence amounts to a 'scare story' (Chairman of the UK General Chiropractic Council) (3) or to 'puffing up (the evidence) out of all proportion' (President of the British Chiropractic Association) (4). A responsible approach to serious therapeutic risks, however, requires an open discussion of the facts.

In this review, I aimed to provide the basis for such a discussion by summarising all fatalities which occurred after chiropractic spinal manipulation and were published in the medical literature.

Methods

Electronic searches were conducted in the following electronic databases: Medline, Embase, AMED, Cochrane Library (September 2009). No restrictions of time or language were applied. Search terms were chiropractic, spinal manipulation, vascular accidents, stroke, death and fatality. In addition, our own departmental files and the bibliographies of the articles thus located were searched. Several experts were also contacted for further data. Case reports were included if they provided information on human patients who had died after receiving one or more treatments from a chiropractor. Data were extracted from the included articles according to predefined criteria (Table 1).

Results

Twenty-six fatalities were published since 1934 in 23 articles (Table 1) (5–27).

Most of the victims were relatively young; 14 were below the age of 40. There was a slight majority of female patients. The type of complication associated with death frequently related to a vascular accident leading to thrombosis and cerebral infarction. The time between treatment and death ranged from 1 h to 58 days; in 10 cases, it was 1 day or less. Unfortunately, the published information was often incomplete.

Many other fatalities seem to have remained unpublished. For instance, the testimony of the chiropractor Preston Long for a court in Connecticut recently listed the family names of nine victims: Mathiason, Solsbury, Mc Cornick, Venegas, Bedenbaugh, Lewis, Fawcett, Parisien, Standt. Long also states that 'many others [are] unknown hidden behind legal agreements of silence' (28). A website names further North American fatalities: Linda Epping (California), G. Fowden (Utah), Ronald Grainger (Alberta), John Hoffman (Maryland), Renate Dora Labonte (Ontario), Jose Lopez (California), Donald Pereyra (Connecticut), Elizabeth A. Roth (Ontario) and Kimberly Lee Strohecker (Pennsylvania) (29).

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Table 1 Published case reports of deaths after chiropractic treatments

References	Year of publication	Victim	Type of vascular accident	Time between treatment and death
Anon (5)	1934	Woman, age unknown	Tear in left lateral sinus	2 weeks
Pratt-Thomas and Berger (6)	1947	32-year-old man	Thrombosis of basilar, left anterior-inferior cerebellar and right posterior-inferior arteries	24 h
Pratt-Thomas and Berger (6)	1947	35-year-old woman	Thrombosis of posterior-inferior cerebellar artery	10 h
Anon (7)	1955	Woman, age unknown	Intra-spinal bleeding and compression of spinal cord	18 h
Ford and Clark (8)	1956	37-year-old man	Thrombosis of basilar, left-posterior cerebellar and left-posterior cerebral arteries	6 h
Ford and Clark (8)	1956	No information provided	Thrombosis of basilar artery	No information provided
Smith and Estridge (9)	1962	33-year-old woman	Infarct of cerebellar and brainstem	3 days
Lorenz and Vogelsang (10)	1972	39-year-old woman	Thrombosis of basilar artery	58 days
Schmitt (11)	1976	35-years-old woman	Infarct of brainstem	1 h
Krueger and Okazaki (12)	1980	25-year-old man	Infarct of brainstem and cerebellum	48 h
Sherman et al. (13)	1981	60-year-old woman	Dissection of vertebral artery	4 days
Ali Cherif et al. (14)	1983	51-year-old man	Infarct of medulla oblongata	11 days
Nielsen (15)	1984	34-year-old man	Dissection of vertebral artery aneurysen	3 h
Zak and Carmody (16)	1984	53-year-old man	Left vertebral, posterior-inferior and superior cerebellar artery occlusion; cerebellar infarction	27 days
Modde (17)	1985	26-year-old woman	Dissection of vertebral artery	1 day
Jentzen et al. (18)	1987	51-year-old man	Infarct of cerebellum and brainstem	No information provided
Sherman et al. (20)	1987	37-year-old man	Infarct of brainstem	3 days
Mas et al. (19)	1989	35-year-old woman	Dissecting aneurysm of vertebral artery	16 h
Raskind and North (21)	1990	47-year-old woman	Cerebellar haemorrheae	No information provided
Sullivan (22)	1992	41-year-old woman	Haemorrhage in ventricular system	8 h
Haynes (23)	1994	36-year-old woman	Dissecting aneurysm of vertebral artery, thrombo-embolism	No information provided
Peters et al. (24)	1995	29-year-old woman	Infarct of right hemisphere	3 days
Klougart et al. (25)	1996	34-year-old man	Unclear	Few hours
Haldeman et al. (26)	2002	Previously unpublished legal cases	No information provided	No information provided
Haldeman et al. (26)	2002	Previously unpublished legal cases	No information provided	No information provided
Dziewas et al. (27)	2003	No information provided	No information provided	No information provided

Discussion

This systematic review demonstrates that numerous deaths have been associated with chiropractic. Usually high-velocity, short-lever thrusts of the upper spine with rotation are implicated. They are believed to cause vertebral arterial dissection in predisposed individuals which, in turn, can lead to a chain of events including stroke and death (1,2,26,30).

Many chiropractors claim that, because arterial dissection can also occur spontaneously, causality between the chiropractic intervention and arterial dissection is not proven. However, when carefully evaluating the known facts, one does arrive at the conclusion that causality is at least likely (e.g. 30,31). Even if it were merely a remote possibility, the precautionary principle in healthcare would mean that neck manipulations should be considered unsafe until proven otherwise. Moreover, there is no good evidence for assuming that neck manipulation is an effective therapy for any medical condition (32). Thus, the risk-benefit balance for chiropractic neck manipulation fails to be positive.

Reliable estimates of the frequency of vascular accidents are prevented by the fact that under-reporting is known to be substantial. In a survey of UK neurologists, for instance, under-reporting of serious complications was 100% (33). Those cases

which are published often turn out to be incomplete. Of 40 case reports of serious adverse effects associated with spinal manipulation, nine failed to provide any information about the clinical outcome (34). Incomplete reporting of outcomes might therefore further increase the true number of fatalities. Obviously, the present article is not aimed at providing incidence figures; this would require a different methodology entirely. To date, no reliable incidence data are available.

This review is focussed on deaths after chiropractic, yet neck manipulations are, of course, used by other healthcare professionals as well. The reason for this focus is simple: chiropractors are more frequently associated with serious manipulation-related adverse effects than osteopaths, physiotherapists, doctors or other professionals. Of the 40 cases of serious adverse effects mentioned above, 28 can be traced back to a chiropractor and none to an osteopath (34). A review of complications after spinal manipulations by any type of healthcare professional included three deaths related to osteopaths, nine to medical practitioners, none to a physiotherapist, one to a naturopath and 17 to chiropractors (35). This article also summarised a total of 265 vascular accidents of which 142 were linked to chiropractors. Another review of complications after neck manipulations published by 1997 included 177 vascular accidents, 32 of which were fatal. The vast majority of these cases were associated with chiropractic and none with physiotherapy (36). The most obvious explanation for the dominance of chiropractic is that chiropractors routinely employ high-velocity, short-lever thrusts on the upper spine with a rotational element, while the other healthcare professionals use them much more sparingly (37,38).

In conclusion, numerous deaths have been associated with chiropractic neck manipulations. There are reasons to suspect that under-reporting is substantial and reliable incidence figures do not exist. The risks of chiropractic neck manipulations by far outweigh their benefits. Healthcare professionals should advise the public accordingly.

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