

The Conflict and History Behind this Issue

- Interdisciplinary conflict between Chiropractors and Physical Therapist and MDs.
- History of allopathic medicine and the antitrust suit by Chiropractors in the 1970's.
- General distrust amongst medical doctors and PT's vs Chiropractors.
- Chiropractors are unscrupulous/unscientific clinicians and...thus manipulations is an unscientific treatment???
- MDs and to a lesser degree Therapists stating that Chiropractors and/or other manipulative practitioners cause strokes by performing cervical manipulations
- Chiropractors counter that they don't cause strokes and further argue that if anyone is causing strokes it would be untrained clinicians like massage therapist or even Physical Therapist who are not qualified to perform cervical manipulation (and spinal manipulation in general).
- What is the truth?
- Have PT's "thrown the baby out with the bathwater" when it comes to manipulation because of the conflicts with chiropractors?

Changes in the how our profession views Manipulation

- 20 years ago manipulation was viewed in a negative light by the majority of therapist.
- Now almost every course I attend at CSM's orthopedic and sports medicine seminars includes some type of discussion about manipulation
 - Manipulation in the low back has become standard of care/best practice for acute low back pain in the military and now in civilian settings
 - Manipulation of the thoracic spine recommended for neck pain and shoulder pain.
 - C-spine manipulation recommended in treatment of lateral epicondylalgia
 - Upper c-spine manipulation for HA's and TMJ

APTA Says Students Should learn Cervical Thrust Manipulations



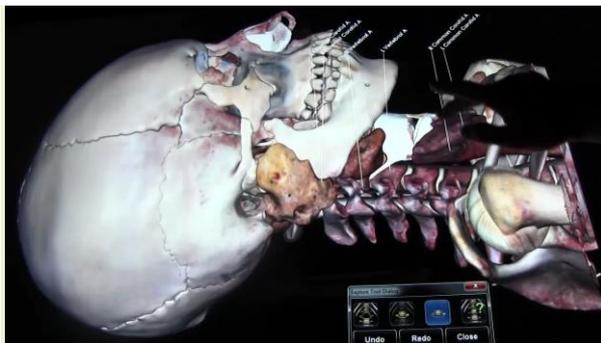
Position on Thrust Joint Manipulation Provided by Physical Therapists.
February 2009

An American Physical Therapy Association White Paper

- There is a large, growing body of research evidence to support and guide the use of TJM for all practitioners. Physical therapists are leading the effort to establish the evidenced-based framework for safe and appropriate use of TJM in treating movement disorders.
- "Physical therapist TJM training should start in professional education (entry-level) programs."
- *Can therapist perform manipulations safer, more effectively, and to a more focused patient subset that are appropriately screened???*

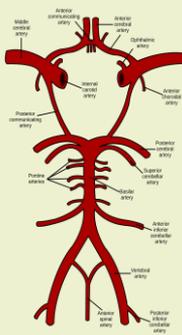
Physical Therapy and Manipulation





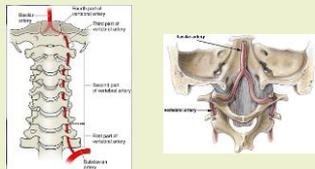
Preparatory Materials

- Vertebral Artery: Supplies 20% blood to the brain. Originates from Subclavian artery
- Vertebral Basilar Artery system consists of three key vessels:
 - Two VAs and one basilar artery. The basilar artery is formed by the two VAs joining each other at the midline



Vertebral Artery

- Along its course, the artery can be viewed as having four portions:
 1. Proximal
 2. Transverse
 3. Suboccipital:
 - thought to be the most vulnerable
 4. Intracranial



Vertebral Artery

- Suboccipital portion of the Vertebral Artery
 - Extends from its exit at the axis (C2) to its point of penetration into the spinal canal
 - Suboccipital portion can be further subdivided into 4 parts:
 - Within the transverse foramen of C2
 - Between C2 and C1
 - In the transverse foramen of C1
 - Between the posterior arch of the atlas and its entry into the foramen magnum



Twisting turning vertebral Artery

- The VA is most vulnerable to compression and stretching at the level of C1–2 with Cervical rotation
- Transverse foramen of C1 is more lateral than that of C2. VA must incline laterally between the two vertebrae
- At this point, the artery is vulnerable to impingement from the following:
 1. Cervical extension at the CV joints
 2. Excursion of the transverse mass of C1 during rotation
 3. Ossification of the atlantoaxial membrane

International Journal of Osteopathic Medicine

Cervical arterial dissection: An overview and implications for manipulative therapy practice

Lucy C. Thomas

There are four mechanisms from which cervical manipulative therapy, in particular high velocity manipulation, is purportedly implicated in the etiology of CAD:

1. the force of the manipulative thrust damages the arterial wall;
2. manipulative therapy in the presence of an existing dissection may propagate embolic material to the brain (Haldeman et al., 1999; Mitchell and Kramschuster, 2008);
3. the positions in which manipulative maneuvers are performed may alter blood flow in the craniocervical arteries (Mitchell, 2009) and
4. although never demonstrated in vivo, the manipulative thrust might cause vertebral artery vasospasm, temporarily altering blood flow to the brain

Debunking at least three of those theories

- Dog and Pig animal studies both indicated examiners could not tear the vertebral artery with manipulation procedures.
- Similarly, cadaver studies have shown that far greater forces than those capable of being produced by manipulation were required to cause damage to the arterial wall (Wuest et al., 2010).
- **Thus the manipulative thrust is unlikely to be forceful enough to cause damage to a normal artery.**
- There is natural variability in blood flow between individuals which does not support theories of biomechanical strain on the artery or risk of arterial dissection. Likewise, examining blood flow in one vessel does not necessarily give any indication of the overall effect on cerebral perfusion via the Circle of Willis.

(Licht et al., 1999; Kawchuk et al., 2008; Wynd et al., 2008).

Stroke in Process is most likely theory

- "It seems unlikely that either the force of the manipulative thrust or the position in which the technique is performed can cause dissection in a normal cervical artery."
- "What cannot be ruled out is the possibility that a manipulative technique or trivial neck strain may cause dissection in a **susceptible artery**, extend a CAD or propagate an embolus" (**THAT IS ALREADY IN PROGRESS**).
- "The critical issues are recognizing a patient with a dissection in progress or identifying a susceptible individual. Blood flow studies indicate how well the body compensates for lack of flow in one vessel but not risk of dissection."

Undoing the demonization of Manipulation

- If we accept the findings of these studies we can at least look at manipulation as less of a **causative factor in CAD** and instead more of a **complicating factor** if screening and physical examination features
- We can focus more on how to prevent missing these patients in our examination findings rather than trying to assign blame to a profession or an intervention.

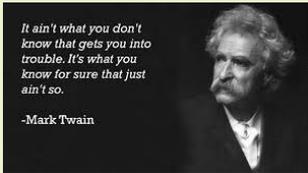
Catchy Quote

- "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle."

— [Sun Tzu, The Art of War](#)



The Missouri Version



HOW COMMON IS CAD

- The annual incidence of internal carotid dissection (ICAD) is estimated as 2.5–3 per 100,000 (around 0.0025% of the population); for vertebral artery dissection (VAD), as 1–1.5 per 100,000 or 0.001% ([Schievinck, 2001](#)).
- Secondly, estimates of CAD following cervical manipulation range at worst, from 1 in 100,000 (0.001%), to 1 in 6,000,000 manipulations ([Lee et al., 1995](#) and [Albuquerque et al., 2011](#)).
- “The exact serious complication risk from cervical spine TJM is unknown. ([Rivett and Milburn](#)) estimated an incidence of severe neurovascular compromise within a range of 1 in 50,000 manipulations to 1 in 5 million manipulations. Other estimates of VBI risk from cervical spine TJM have been stated as being 6 in 10 million manipulations, or 0.00006%, 30, 31 and the risk of death at 3 in 10 million manipulations.
 - Haldeman S, Kohlbeck FJ, McGregor M. Risk factors and precipitating neck movements causing vertebralbasilar artery dissection after cervical trauma and spinal manipulation. *Spine.* 1999;24: 785-94. 31.
 - Hurwitz EL, Akar PD, Adams AH, Meeker WC, Shekelle PG. Manipulation and mobilization of the cervical spine: a systematic review of the literature. *Spine.* 1996;21:1746-1760.

Put those numbers in perspective

- Some authors have compared the estimated rate of occurrence of manipulation-induced injury to other treatments for cervical impairments.
 - Dabbs and Lauretti suggested that the risk of complications (eg, gastrointestinal ulcers, hemorrhage) or death from the use of nonsteroidal anti-inflammatory drugs (NSAIDs) is 100 to 400 times greater than for the use of cervical manipulation.
 - Hurwitz et al reported that the incidence of a “serious gastrointestinal event” associated with NSAID use was 1 in 1,000 patients compared with 5 to 10 cases of complication per 10 million cervical manipulations.
 - Hurwitz et al also reported that cervical spine surgery, by comparison, had 15.6 cases of complication per 1,000 surgeries.
- *Although most of these estimates indicate that the incidence of complications due to cervical spine manipulation is rare, some authors have suggested that the reliance on published cases will produce an underestimation of the injuries associated with these procedures as most practitioners are not rushing to write up a case where their patient had a complication.

When in doubt...Follow the money Actuary Data on Malpractice Premiums

- Median premiums reported by specialists:
 - Plastic surgeons: \$30,000
 - Cardiologists: \$24,000
 - Urologists: \$22,500
 - Emergency/acute care practitioners: \$20,000
 - Neurologists/neurosurgeons: \$20,000
 - Gastroenterologists: \$17,900
 - Hospitalists: \$13,700
 - Ophthalmologists: \$12,800
 - Dermatologists: \$10,300
 - Psychiatrists: \$7,700
- Physical Therapist quote from HPSO: \$160
- Chiropractors premiums \$450-1000

Risk, Returns, and Realities

Systematic Review and Meta-analysis of Chiropractic Care and Cervical Artery Dissection: No Evidence for Causation

Matthew G. Cole, Alexander Macrao and John R. Adler
Department of Neurosurgery, Penn State Hershey Medical Center

CONCLUSIONS The quality of the published literature on the relationship between chiropractic manipulation and CAD is very low. Our analysis shows a small association between chiropractic neck manipulation and cervical artery dissection. This relationship may be explained by the high risk of bias and confounding in the available studies, and in particular by the known association of neck pain with CAD and with chiropractic manipulation. There is **no convincing evidence to support a causal link between chiropractic manipulation and CAD**. Belief in a causal link may have significant negative consequences such as numerous episodes of litigation.

Man Ther. 2016 Feb;21:2-9. doi: 10.1016/j.math.2015.07.008. Epub 2015 Jul 29. Cervical arterial dissection: An overview and implications for manipulative therapy practice.

- Cervical arterial dissection (CAD) is a common cause of stroke in young people under 55 years. It can occur spontaneously or subsequent to minor trauma or infection. The incidence is difficult to determine accurately as not all CAD progress to stroke. CAD is the most catastrophic adverse event associated with cervical manipulative therapy but it is rare. Early features of CAD can mimic a painful musculoskeletal presentation and a patient may present for treatment of neck pain and headache with a dissection in progress. **Whether the manipulative technique is responsible for dissection or whether the diagnosis of CAD has been missed is unclear.** Identification of individuals at risk, or early recognition of CAD could help expedite medical intervention and avoid inappropriate treatment.
- **IMPLICATIONS:**
 - For those patients presenting with recent onset, moderate to severe unusual headache or neck pain, clinicians should perform a careful history, in particular questioning about recent exposure to head/neck trauma or neck strain. Cardiovascular factors may not be particularly useful indicators of risk of dissection. Clinicians should also be alert to reports of transient neurological dysfunction such as visual disturbance and balance deficits, arm paresthesia and speech deficits, as these may be subtle. If clinicians suspect arterial dissection is in progress patients should be urgently referred for medical evaluation.

Older studies/publications trend towards recommendations that manipulation is not safe

• Manipulation of the Cervical Spine: Risks and Benefits
Physical Therapy Journal Jan 1999
Richard P Di Fabio

Conclusion: Although the risk of injury associated with MCS (manipulation of cervical spine) appears to be **small**, this type of therapy has the potential to expose patients to vertebral artery damage that can be avoided with the use of mobilization (non thrust passive movements).

The literature does not demonstrate that the benefits of MCS outweigh the risks.

New Retrospective Studies indicate manipulation safety

RISK OF STROKE AFTER CHIROPRACTIC SPINAL MANIPULATION IN MEDICARE B BENEFICIARIES AGED 66 TO 99 YEARS WITH NECK PAIN James M. Whedon, DC, MS, a Yunjie Song, PhD, b Todd A. Mackenzie, PhD, c Reed B. Phillips, DC, PhD, d Timothy G. Lukovits, MD, e and Jon D. Lurie, MD, MS

• Journal of Manipulative and Physiological Therapeutics, volume 38, Issue 2, Feb 2015 pages 93-101

• Conclusion: Among Medicare B beneficiaries aged 66 to 99 years with neck pain, incidence of vertebrobasilar stroke was extremely low. Small differences in risk between patients who saw a chiropractor and those who saw a primary care physician are probably not clinically significant.

doi:10.1016/j.jmpt.2014.11.003
Published online 2015 Feb 26, doi: 10.1016/j.jmpt.2014.11.003
PMID: 25627198
Risk of Vertebrobasilar Stroke and Chiropractic Care
Results of a Population-Based Case-Control and Case-Crossover Study
J. Lurie, MD, MS, a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, aa, ab, ac, ad, ae, af, ag, ah, ai, aj, ak, al, am, an, ao, ap, aq, ar, as, at, au, av, aw, ax, ay, az, ba, bb, bc, bd, be, bf, bg, bh, bi, bj, bk, bl, bm, bn, bo, bp, bq, br, bs, bt, bu, bv, bw, bx, by, bz, ca, cb, cc, cd, ce, cf, cg, ch, ci, cj, ck, cl, cm, cn, co, cp, cq, cr, cs, ct, cu, cv, cw, cx, cy, cz, da, db, dc, dd, de, df, dg, dh, di, dj, dk, dl, dm, dn, do, dp, dq, dr, ds, dt, du, dv, dw, dx, dy, dz, ea, eb, ec, ed, ee, ef, eg, eh, ei, ej, ek, el, em, en, eo, ep, eq, er, es, et, eu, ev, ew, ex, ey, ez, fa, fb, fc, fd, fe, ff, fg, fh, fi, fj, fk, fl, fm, fn, fo, fp, fq, fr, fs, ft, fu, fv, fw, fx, fy, fz, ga, gb, gc, gd, ge, gf, gg, gh, gi, gj, gk, gl, gm, gn, go, gp, gq, gr, gs, gt, gu, gv, gw, gx, gy, gz, ha, hb, hc, hd, he, hf, hg, hh, hi, hj, hk, hl, hm, hn, ho, hp, hq, hr, hs, ht, hu, hv, hw, hx, hy, hz, ia, ib, ic, id, ie, if, ig, ih, ii, ij, ik, il, im, in, io, ip, iq, ir, is, it, iu, iv, iw, ix, iy, iz, ja, jb, jc, jd, je, jf, jg, jh, ji, jj, jk, jl, jm, jn, jo, jp, jq, jr, js, jt, ju, jv, jw, jx, jy, jz, ka, kb, kc, kd, ke, kf, kg, kh, ki, kj, kk, kl, km, kn, ko, kp, kq, kr, ks, kt, ku, kv, kw, kx, ky, kz, la, lb, lc, ld, le, lf, lg, lh, li, lj, lk, ll, lm, ln, lo, lp, lq, lr, ls, lt, lu, lv, lw, lx, ly, lz, ma, mb, mc, md, me, mf, mg, mh, mi, mj, mk, ml, mm, mn, mo, mp, mq, mr, ms, mt, mu, mv, mw, mx, my, mz, na, nb, nc, nd, ne, nf, ng, nh, ni, nj, nk, nl, nm, nn, no, np, nq, nr, ns, nt, nu, nv, nw, nx, ny, nz, oa, ob, oc, od, oe, of, og, oh, oi, oj, ok, ol, om, on, oo, op, oq, or, os, ot, ou, ov, ow, ox, oy, oz, pa, pb, pc, pd, pe, pf, pg, ph, pi, pj, pk, pl, pm, pn, po, pp, pq, pr, ps, pt, pu, pv, pw, px, py, pz, qa, qb, qc, qd, qe, qf, qg, qh, qi, qj, qk, ql, qm, qn, qo, qp, qq, qr, qs, qt, qu, qv, qw, qx, qy, qz, ra, rb, rc, rd, re, rf, rg, rh, ri, rj, rk, rl, rm, rn, ro, rp, rq, rr, rs, rt, ru, rv, rw, rx, ry, rz, sa, sb, sc, sd, se, sf, sg, sh, si, sj, sk, sl, sm, sn, so, sp, sq, sr, ss, st, su, sv, sw, sx, sy, sz, ta, tb, tc, td, te, tf, tg, th, ti, tj, tk, tl, tm, tn, to, tp, tq, tr, ts, tt, tu, tv, tw, tx, ty, tz, ua, ub, uc, ud, ue, uf, ug, uh, ui, uj, uk, ul, um, un, uo, up, uq, ur, us, ut, uu, uv, uw, ux, uy, uz, va, vb, vc, vd, ve, vf, vg, vh, vi, vj, vk, vl, vm, vn, vo, vp, vq, vr, vs, vt, vu, vv, vw, vx, vy, vz, wa, wb, wc, wd, we, wf, wg, wh, wi, wj, wk, wl, wm, wn, wo, wp, wq, wr, ws, wt, wu, wv, ww, wx, wy, wz, xa, xb, xc, xd, xe, xf, xg, xh, xi, xj, xk, xl, xm, xn, xo, xp, xq, xr, xs, xt, xu, xv, xw, xx, xy, xz, ya, yb, yc, yd, ye, yf, yg, yh, yi, yj, yk, yl, ym, yn, yo, yp, yq, yr, ys, yt, yu, yv, yw, yx, yy, yz, za, zb, zc, zd, ze, zf, zg, zh, zi, zj, zk, zl, zm, zn, zo, zp, zq, zr, zs, zt, zu, zv, zw, zx, zy, zz

Results

• There were 818 VBA strokes hospitalized in a population of more than 100 million person-years. In those aged <45 years, cases were about three times more likely to see a chiropractor or a PCP before their stroke than controls. Results were similar in the case control and case crossover analyses. There was no increased association between chiropractic visits and VBA stroke in those older than 45 years. Positive associations were found between PCP visits and VBA stroke in all age groups. Practitioner visits billed for headache and neck complaints were highly associated with subsequent VBA stroke.

Conclusion

• VBA stroke is a very rare event in the population. The **increased risks of VBA stroke associated with chiropractic and PCP visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke.** We found no evidence of excess risk of VBA stroke associated chiropractic care compared to primary care.

Is there any value to performing Cervical Manipulation

- A Cochrane Review of Manipulation and Mobilization for Mechanical Neck Disorders Spine:

[15 July 2004 - Volume 29 - Issue 14 - pp 1541-1548](#)

doi: 10.1097/D01.BRS.0000131218.35875.E0

Gross, Anita R. MSc*; Hoving, Jan L. PhD; Haines, Ted A. MSc*; Goldsmith, Charles H. PhD*; Kay, T MSc; Aker, Peter MSc; Brunsford, Geoff PhD; para: the Cervical Overview Group

- **Conclusions. Mobilization and/or manipulation when used with exercise are beneficial for persistent mechanical neck disorders with or without headache.**
- Done alone, manipulation and/or mobilization were not beneficial; when compared to one another, neither was superior. There was insufficient evidence available to draw conclusions for neck disorder with radicular findings.

More on the Efficacy of Cervical Manipulation

- Evid Based Spine Care J. 2013 Apr; 4(1): 30–41. doi: [10.1055/s-0033-1341605](#) PMID: PMC3699243

The Outcomes of Manipulation or Mobilization Therapy Compared with Physical Therapy or Exercise for Neck Pain: A Systematic Review

[Josh Schroeder](#)¹, [Leon Kaplan](#)², [Dena J. Fischer](#)³ and [Andrea C. Skelly](#)³

- **Conclusion:** The data available suggest that there are minimal short- and long-term treatment differences in pain, disability, patient-rated treatment improvement, treatment satisfaction, health status, or functional improvement when comparing manipulation or mobilization therapy to physical therapy or exercise in patients with neck pain.
- **Exercise and Manipulation both work equally well**

[J Manipulative Physiol Ther. 1997 Jun;20\(5\):326-30.](#)

The effect of spinal manipulation in the treatment of cervicogenic headache.

[Nilsson N](#)¹, [Christensen HW](#), [Harvigsen J](#).

- Fifty-three subjects suffering from frequent headaches who fulfilled the International Headache Society criteria for cervicogenic headache (excluding radiological criteria). These subjects were recruited from 450 headache sufferers who responded to newspaper advertisements.
- **RESULTS:**
- The use of analgesics decreased by 36% in the manipulation group, but was unchanged in the soft-tissue group; this difference was statistically significant ($p = .04$, chi 2 for trend). The number of headache hours per day decreased by 69% in the manipulation group, compared with 37% in the soft-tissue group; this was significant at $p = .03$ (Mann-Whitney). Finally, headache intensity per episode decreased by 36% in the manipulation group, compared with 17% in the soft-tissue group; this was significant at $p = .04$ (Mann-Whitney).
- **CONCLUSION:**
- Spinal manipulation has a significant positive effect in cases of cervicogenic headache.

More research on Efficacy of Cervical Manipulation

The Spine Journal 4 (2004) 335–356 Review Article Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis

Gert Bronfort, PhD, DCa, Mitchell Haas, DC, MAb, Rami L. Evans, DC, MSA, Lex M. Bouter, PhDc

- **Conclusion:** Our data synthesis suggests that recommendations can be made with **some confidence regarding the use of SMT and/or Mobilization as a viable option for the treatment of both low back pain and Neck Pain.**

Clinical practice guideline on the use of manipulation or mobilization in the treatment of adults with mechanical neck disorders

Manual Therapy 2002;vol 7(4) pp. 391-395

Gross A, Kay T, Kennedy C, Gasner D, Hurley L et. al.

- **RESULTS:** Manipulation and mobilization alone showed similar effects as placebo, wait period, or control group, and appeared similar in benefit for pain relief. While high-technology exercises were superior to manipulation alone for improving long-term pain scores, manipulation plus low-technology exercise had the same effect. Patient satisfaction scores favored manipulation plus low-technology exercise over manipulation alone, and high-technology exercise alone. Multi-modal care including some combination of manipulation or mobilizations and exercise was superior to control, other physical medicine methods, and rest. Based on weak evidence, estimates for serious complication for manipulation ranged from one in 20,000 to five in 10,000,000.
- **RECOMMENDATIONS:** Stronger evidence suggests a multi-modal management strategy using mobilization or manipulation plus exercise is beneficial for relief of mechanical neck pain. Weaker evidence suggests less benefit to either manipulation/mobilization done alone than when used with exercise. The risk rate is uncertain.

What does our Profession Believe

- Thrust joint manipulation utilization by U.S. physical therapists
 - Puentedura E, Slaughter R, Reilly S, Ventura E, Young D et. Al
 - **Journal of Manual & Manipulative Therapy**
2016 pp: 1-15
 - Results: A majority of respondents felt that TJM (thrust joint manipulation) was safe and effective when applied to lumbar (90.5%) and thoracic (91.1%) spines; however, a smaller percentage (68.9%) felt that about the cervical spine. More therapists reported they would perform additional screening prior to providing TJM to the cervical spine than they would for the lumbar and thoracic spines.
 - Finally, therapists who are male; practice in orthopedic spine setting; are aware of manipulation clinical prediction rules; and have manual therapy certification, are more likely to use TJM and be comfortable with it in all three regions.

Clinical Practice Guidelines for mobilization/manipulation

- Clinical practice guideline on the use of manipulation or mobilization in the treatment of adults with mechanical neck disorders
 - [Manual Therapy Volume 7, Issue 4](#), November 2002, Pages 193-205
 - Gross, A.R, Kay, T.M, Kennedy, C, Gasner, D, Hurley, L, Yardley, K, Hendry, L, McLaughlin, L
- Conclusion Manipulation and mobilization alone showed similar effects as placebo, wait period, or control group, and appeared similar in benefit for pain relief. While high-technology exercises were superior to manipulation alone for improving long-term pain scores, manipulation plus low-technology exercise had the same effect.
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Are Adverse Events (AE) Preventable?

- J Man Manip Ther. 2012 May; 20 (2): 66-74
- Safety of cervical spine manipulation: are adverse events preventable and are manipulations being performed appropriately? A review of 134 case reports
- [Emilia D'Augustina](#)¹, [Jessica March](#)², [Joe Anders](#)³, [Amber Dixon](#)², [Merrill R Landers](#)³, [Harvey W Wollmann](#)² and [Joshua A Cleland](#)⁴
 - One hundred thirty four cases, reported in 93 case reports, were reviewed. There was no significant difference in proportions between appropriateness and preventability, $P = .46$. Of the 134 cases, 60 (44.8%) were categorized as preventable, 14 (10.4%) were unpreventable and 60 (44.8%) were categorized as 'unknown'. CSM was performed appropriately in 80.6% of cases. Death resulted in 5.2% (n=7) of the cases, mostly caused by arterial dissection.
 - This review showed that, if all contraindications and red flags were ruled out, there was potential for a clinician to prevent 44.8% of AEs associated with CSM. Additionally, 10.4% of the events were unpreventable, suggesting some inherent risk associated with CSM even after a thorough exam and proper clinical reasoning.
 - However 26% of patients that had Adverse events were being seen for something other than their neck and so neck treatment was not appropriate.

Debate about CAD and Manipulation

- Stroke reporting might be low because patients die or clinicians don't report
- Is their a way to screen patient properly?
- Value of manipulation may not support it's use even the risk is very low (i.e. reducing neck pain isn't worth the risk of dying)
- Litigation society doesn't support that a lot would go unreported

The recommendations for accessing for VBI



**Clinical Guidelines
for Assessing Vertebrobasilar Insufficiency
in the Management of Cervical Spine Disorders**

Clinical Guidelines for Assessing Vertebrobasilar Insufficiency in Management of Cervical Spine Disorders

• Subjective Questions Needs to occur at all stages of eval and treatment

• 5 D's And 3 N's

- Dysarthria (difficulty with speech)
- Dysphagia (difficulty swallowing)
- Drop attacks (blacking out/passing out)
- Dizziness
- Double vision
- Ataxia
- Nausea/vomiting
- Numbness
- Nystagmus

Other symptoms

- Lightheadedness
- Disorientation and anxiety
- Tinnitus or other hearing disturbances
- Pallor, tremors and sweating
- Other neurological symptoms
- Neck pain and HA's

Other Risk Factors

- Horner's Syndrome
- Klippel-Trenaunay Syndrome (KTS): port wine stain
- Arteriovenous Fistulas: abnormal connections between an artery and vein



Aggravating factors

- The type, degree, frequency and duration of the dizziness or other symptoms
- The production or aggravation of the symptoms by neck movements or sustained positions, particularly
- Those involving rotation or extension
- The temporal history of the symptoms relative to the history of the patient's complaint
- The status of the symptoms
- Any previous treatment and its effect on the symptoms.

Differentiation of Vestibular symptoms (BPPV) from VBI

- The type, degree, frequency and duration of the dizziness or other symptoms
- The production or aggravation of the dizziness by neck movements or sustained positions, particularly those involving rotation or extension
- The temporal history of the symptoms relative to the history of the patient's complaint
- The status of the symptoms
- Any previous treatment and its effect on the symptoms.

VBI Test, DeKleyn's Test, Hall Pike Dix Maneuver, George's Test

• Poor reliability for VBI testing



- [J Manipulative Physiol Ther.](#) 1996 Mar-Apr;19(3):159-64.
- **The validity of the extension-rotation test as a clinical screening procedure before neck manipulation: a secondary analysis.**
- [Côté P,](#) [Kreitz BG,](#) [Cassidy JD,](#) [Thiel H](#)
- **CONCLUSION:**
- We were unable to demonstrate that the extension-rotation test is a valid clinical screening procedure to detect decreased blood flow in the vertebral artery. The value of this test for screening patients at risk of stroke after cervical manipulation is questionable.

Another Screen for Potential Vertebral Artery Dysfunction

• Wallenberg's Position



- The patient is placed in a sitting position.
- The head is rotated to one side and extension is added. This position is held for 30 seconds.
- The process is repeated on the opposite side.
- A positive test is identified by initiation of symptoms such as dizziness, diplopia, dysphasia, dysarthria, drop attacks, nausea, and nystagmus.
- *****Vertebral Basilar Insufficiency VBI test** very similar; end range rotation without extension hold 10 secs, return to neutral for 10 seconds, other side for 10 seconds. Dizziness, diplopia, dysarthria, drop attacks, nausea and nystagmus

Odd rumors about VBI that need to be cleared up

Are Oral Contraceptives a risk factor with cervical manipulation and stroke?

- Older study Haldeman said yes...
- Newer systematic review says
 - No case-control studies were identified; however, oral contraceptive use was positively associated with CAD in 3 studies in bivariate analysis. In only 1 study was the association statistically significant ($P<0.001$).
- So research does not indicate that Oral Contraceptives place patients at greater risk

Are Migraines a risk factor for CAD?

- Migraine and the risk of cervical artery dissection: A case-control study
 - NEUROLOGY 2002;59:435–437 C. Tzourio, MD, PhD; L. Benslamia, MD; B. Guillon, MD; S. Aidi, MD; M. Bertrand, MSc; K. Berthet, MD; and M. G. Bousser, MD
 - Our findings are consistent with a previous case-control study showing that migraine was significantly more frequent in patients with CAD than in control subjects without stroke.
 - In patients with CAD, migraine started later in life and was characterized by a higher frequency of attacks than in control subjects but not in the period preceding dissection

Clinical Prediction Rule for patients with neck pain likely to benefit from TJM to C-spine

- Puentedura, Emilio J
- Cleland, Joshua A; Landers, Merrill R; Mintken, Paul E; Louw, Adriaan; Fernández-de-Las-Peñas, César
 - Results: A clinical prediction rule with 4 attributes
 - symptom duration less than 38 days,
 - positive expectation that manipulation will help,
 - side-to-side difference in cervical rotation range of motion of 10° or greater, and
 - pain with posteroanterior spring testing of the middle cervical spine) was identified.
- If 3 or more of the 4 attributes (positive likelihood ratio of 13.5) were present, the probability of experiencing a successful outcome improved from 39% to 90%.

Alternative Clinical Prediction Rule (CPR) for Cervical Spine Manipulation

1. Initial scores on NDI less than 11.50
 2. Presence of bilateral pattern of involvement
 3. Not performing sedentary work for more than 5 hours each day
 4. Report of feeling better while moving the neck
 5. No report of feeling worse while extending the neck
 6. The diagnosis of spondylosis without radiculopathy
- Four or more 89% chance of immediate positive response to manipulation
 - CPI has not been validated like the low back CPI has

Interesting Lumbar Study...unknow if it is applicable to lumbar spine

- *Journal of Orthopaedic & Sports Physical Therapy*, 2006 Volume:36 Issue:4 Pages:209–214 DOI:10.2519/jospt.2006.36.4.209
- The Use of a Lumbar Spine Manipulation Technique by Physical Therapists in Patients Who Satisfy a Clinical Prediction Rule: A Case Series
- **Authors:** Joshua A. Cleland, DPT, PhD, OCS¹; Julie M. Fritz, PT, PhD, ATC²; Julie M. Whitman, PT, DSc, OCS, FAAOMPT³; John D. Childs, PT, PhD, MBA, OCS, FAAOMPT⁴; Jessica A. Palmer, MPT⁵

Take home message was that if patients met criteria and we are not performing HVLA the patients symptoms will likely continue to deteriorate.

Common scenario

- 32 y/o female with history of chronic neck pain, HA's that she describes as migraines, occasional light headedness especially when standing up too quickly. Nausea occurs early in the mornings and with certain odors. On oral contraceptives.
- ROM grossly WFL but asymmetrical in cervical rotation
- Joint mobility testing reveals pain upon palpation to C2 Spinous and C1 transverse process
- Is the is patient a good candidate for manipulation?

When Treating the neck respect the Joints

- Treat along the same plane of motion as the joint moves.
- Sidegliding at C0
- Rotation at C1
- Sidebending at lower levels of the spine

Some examples of ways to minimize stress on the c-spine while performing manipulation

- Practical demonstrations
