Spinal Manipulations
The Similarities and Disparities Between Osteopaths, Chiropractors and Physical Therapists Around the World

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My origins?
Belgium - Europe
Lived in Brussels - Belgium

“The Great Market”

Belgium... the land of
University Education:
Catholic University Of Louvain-la-Neuve
Physical Education
Physical Therapy

Job

- Worked as a physical therapist in Belgium, then in South America in a hospital in Paramaribo (Suriname)
Opportunities

- Opportunities following South America
  - Belgium: School of Osteopathy
  - USA: Graduate School

Job + Graduate School

- USA – Texas Tech University
History of spinal manipulation therapy

- Roots of spinal manipulation found in folk traditions of "bone setting"
- Documented use as far back as
  - Ancient Egyptians
  - Asian Cultures
  - Hippocrates
- Often associated with audible "popping" sound.
- Still practiced in the UK and is protected


Chiropractic: its history

- from Greek
  - chiro- χειρο- "hand-" + praktikós πρακτικός "concerned with action"
- Daniel D Palmer,
  - founder of chiropractic (1897)
- 1895: in Davenport, Iowa, Daniel Palmer, a Canadian immigrant who worked as a grocer manipulated the cervical vertebra of Henry Lillard and reported relief of the patient’s deafness.

Chiropractic: definition

- Chiropractic treatment emphasizes manual therapy including spinal manipulation and other joint and soft tissue manipulation, and includes exercises and health and lifestyle counseling.
- Traditionally, it assumes that a vertebral subluxation or spinal joint dysfunction can interfere with the body’s function and its innate ability to heal itself.


Chiropractic schools in the World

- USA: 18
- UK: 3
- Canada: 2
- Australia: 2
- Japan: 2
- Brazil: 2
- South Africa: 2
- Sweden: 1
- Mexico: 1
- New Zealand: 1
- Denmark: 1
- France: 1
Chiropractors in Europe

- Over 70 years of presence
  - France: rebouteux
  - Germany: knochen-einrichter
  - Spain: algebrista
  - Denmark: kloge folk
  - Britain: bonesetters

Chiropractic Education

- Highly variable
- In the US: doctorate degree – 4-year program
- Other countries: Bachelor and Masters of Sciences

Chiropractors in Europe

- Switzerland
  - Part of insurance law
- Greece
  - Unrecognized, uncovered, but not illegal

Osteopathy: its history

- **Andrew Taylor Still**, founder of Osteopathy (1892) in Kirksville, Missouri
  - In Medical school in Kansas City, lost 4 children due to spinal meningitis and pneumonia. Disgusted with traditional medicine. Did not finish medical school.
  - Medical practice relying on a system of manipulation and spinal reflexes that he devised to treat all types of conditions
  - Named his new school of medicine "osteopathy," reasoning that "the bone, osteon, was the starting point from which [he] was to ascertain the cause of pathological conditions."

Osteopathic schools in the World

- USA: 28
- Canada: 2
- UK: 8
- More in European and Asian countries (China has approached the AOA to train family physicians)

Osteopathic Education

- Variable
- In the US & Canada:
  - doctorate degree – 4-year program
- Practice as MD’s
- Other countries: Bachelor and Masters of Sciences
- Can be osteopathy on his own, or physical therapists and MD’s

http://en.wikipedia.org/wiki/Osteopathy
What about
Physical Therapy
Physiotherapy
Fysiotherapy
Kinésitherapie
Masso-kinésithérapie

same meanings

Physical Therapy: its history

- 400 B.C. Hippocrates and Hector used water therapy, traction, movement as therapeutic approaches.
- 1894: as a profession in Great Britain with 4 nurses
- 1940s mainly exercise, massage, and traction.
- 1950s Manipulative procedures to the spine and extremity joints began to be practiced
Physical Therapy schools in the World

- **USA:** 200
- **Education**
  - **USA:** doctorate level (3-3 or 4-2)
  - **Other countries highly variable:**
    - Some European countries: university degree and others not

Contentious history of spinal manipulation

- **1895:** Daniel Palmer, manipulated the cervical vertebra of Henry Lillard and reported relief of the patient's deafness.
- **1986:** Brownson et al. described the development of sudden deafness in two patients who underwent manipulation of the cervical spine by osteopathic physicians.

Manipulation – Physical Therapy

Guide to Physical Therapist Practice

- Mobilization/manipulation: A manual therapy technique comprising a continuum of skilled passive movements to the joints and/or related soft tissue that are applied at varying speeds and amplitudes, including a small-amplitude/high-velocity therapeutic movement.
- Thrust manipulation as “high velocity, low amplitude therapeutic movements within or at end range of motion.”

Manipulation Education Manual For Physical Therapist Professional Degree Programs
- Manipulation Education Committee: APTA Manipulation Task Force, 2004

Manipulation – Chiropractic

- Spinal Manipulation: Passive manual maneuver during which a three-joint complex is taken past the normal physiological range of movement without exceeding the anatomical boundary limit; its defining factor is a dynamic thrust, a sudden force that causes an audible release and attempts to increase a joint’s range of motion.

Manipulation – Osteopathic

**Manipulation**: the therapeutic application of manual pressure or force. In osteopathy, the manipulation itself is only part of a philosophy of care; it is regarded as an adjunct to other medical care. An emphasis on the importance of the musculoskeletal system in health and disease is a strong feature of the education of an osteopathic physician.


Manipulation - Osteopathic

Thoracic
Manipulation – Chiropractic

Thoracic

Manipulation – Physical Therapy

Thoracic Spine

Intervertebral Joints T4-T10
Posteroanterior Thrust
Grade V Manipulation
Manipulation – Osteopathy

Manipulation – Chiropractic
Manipulation – Physical Therapy - Maitland

Lumbar Spine;
Intervertebral Joints
T10-S1 (Rotation)
- As a Mobilisation

So what is the difference?

So what is the difference?

- **Goals of treatment – Osteopathy**
  - Osteopathic physicians are trained to place emphasis on the achievement of normal body mechanics as central to maintaining good health.
  - Manipulative treatment is taught as an adjunctive measure to other biomedical interventions for a number of disorders and diseases.

Johnson SM, Kurtz ME. Diminished use of osteopathic manipulative treatment and its

So what is the difference?

- **Goals of treatment – Physical Therapy**
  - Physical therapists use joint manipulation/mobilization to relieve and prevent physical disability.
  - Physical therapists base their manipulative treatment on loss of mobility and pain.
  - Physical therapists will discontinue use of manipulation when mobility is restored and symptoms are resolved.

So what is the difference?

- **Goals of treatment – Chiropractic**
  - use adjustment/manipulation over the spine to restore and maintain health.
  - may focus on correcting and preventing vertebral “subluxations”.
  - A chiropractor who follows the subluxation theory may continue manipulating the spine of an asymptomatic patient for preventive maintenance purposes.
  - Some chiropractic patients have preventive maintenance spinal adjustments to correct what they believe is a constant cause of disease in their spine. James Cyriax, MD referred to such fear as chiropractogenic neurosis.


“Pop” – Placebo & Nocebo Effects

- Perfectly normal joints can be made to “pop”.
- Adjusting or popping a normal spine to correct “subluxations” can have nocebo and placebo effects.
  - The *placebo* effect is evident by patients who feel better because they believe that a vertebra has been realigned when manipulation pops the spine.
  - The *nocebo* effect is shown by patients who believe that vertebrae are constantly slipping in and out of place, producing fear in the patients that they will become ill if subluxations are not corrected or prevented by regular adjustments.

Mobilization or Manipulation? Which is more strenuous?

Maitland Rotation mobilization

Mobilization or Manipulation? Which is more strenuous?

Rotation Manipulation HVLA C4-5 – Physical therapy osteopathic
Mobilization or Manipulation? Which is more strenuous?

Cervical Manipulation HVLA - seated
Chiropractic

Mobilization or Manipulation? Which is more strenuous?

Cervical Manipulation HVLA - supine
Chiropractic
Mobilization or Manipulation?
Which is more strenuous?

- Cervical Mobilizations (Snodgrass, 2007)
  - grade I: 21.8 N; SD, 15.0
  - grade II: 34.9 N; SD, 20.9
  - grade III: 58.2 N; SD, 27.5
  - grade IV: 61.0 N; SD, 29.9

- Lumbar Mob (Threlkeld, 1992)
  - grade I: 52.16 (36.11)
  - grade II: 119.23 (50.96)
  - grade III: 179.31 (63.34)
  - grade IV: 242.25 (69.17)

- Thoracic Mob (Cook, 2002)
  - grade I: 91.1 - 205.8 (range)
  - grade II: 34.9 N; SD, 20.9
  - grade III: 58.2 N; SD, 27.5
  - grade IV: 61.0 N; SD, 29.9

- Spinal manipulations
  - Forces are smaller for spinal manipulations of the cervical spine compared to the thoracic spine and sacroiliac joint.
  - Cervical: mean peak force = 117.7 N (+/- 15.6 N)
  - Thoracic: average peak force = 238.2 N

- The inconsistency in manual force application during PA spinal mobilization in existing studies suggests that further studies are needed to improve the clinical standardization of manual force application. Future research on mobilization should include forces applied to the cervical and thoracic spines.


ROM Testing or Manipulation?
Which is more strenuous?

- Symons et al., 2002
- Cadaveric study
- Cervical Manipulations resulted in
  - average strain of 6.2% +/- 1.3% to the distal (C0-C1) loop of the VA and a 2.1% +/- 0.4% strain to the proximal (C6) loop.
  - These values were similar to or lower than the strains recorded during diagnostic and range of motion testing.

Questions

- Where is the evidence about the effectiveness of spinal manipulations?
- Are they safe?

Mobilizations vs Manipulations
What works best?

- Cervical spine
  - Osteopaths – Spain - RCT
  - “Single cervical HVLA manipulation C3-4-5 was more effective in reducing neck pain at rest and in increasing active cervical range of motion than a control mobilization procedure in subjects suffering from mechanical neck pain.”

Mobilizations vs Manipulations

- **Cervical Spine – Cochrane review**
  - 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 are not beneficial
  - Effectiveness is equal


Cervical Manipulations – Are they safe?

- **Serious adverse events**
  - **Manipulations**
    - 6/100,000 $\rightarrow$ 5/1,000,000
    - 1/ 100,000 persons


Cervical Manipulations - Risks

- **Serious adverse events**
  - **NSAIDs**
    - bleeding or perforation: 4/1,000
    - Death: 4/10,000
  - Problems with this line of argument:
    1. Efficacy of NSAIDs is undoubted but that of spinal manipulation is not
    2. Adverse effects of NSAIDs are subject to post-marketing surveillance while those of spinal manipulation are not.
    3. Other therapeutic options (e.g. exercise therapy) have not been associated with significant risks.


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Cervical Manipulations - Risks

- **Frequency and Clinical Predictors of Adverse Reactions to Chiropractic Care in the UCLA Neck Pain Study**
  - 336 patients
  - 30.4% adverse symptoms following chiropractic care
  - “Adverse reactions appear more likely to follow cervical spine manipulation than mobilization. Given the possible higher risk of adverse reactions and lack of demonstrated effectiveness of manipulation over mobilization, chiropractors should consider a conservative approach for applying manipulation to their patients, especially those with severe neck pain.”

Cervical Manipulations - Risks

- Serious adverse events
  - Alert from Portugal after three cases of serious adverse events:
    - VBI stroke
    - neuropraxic injury
    - epidural hematoma
  - “The described serious adverse events promptly recommend the implementation of a risk alert system.”


Cervical Manipulations – Serious Injuries

- Arterial Dissection 20%
- Brain-Stem Injury 18%
- Cerebral/Cerebellar Injury 10%
- Spinal cord Injury 9%

Cervical Manipulations Risks and Physical Therapists

- Physical Therapists involved in less than 2% of injuries due to cervical manipulation
- The risks to damage the vertebral artery can be avoided by using mobilization
- *Manipulation benefits do not outweigh their risks*


Cervical Manipulation: Who is Responsible for deaths?

- Di Fabio (1999): no death attributed to Cervical Manipulations by Physical Therapists

Cervical Manipulation:
Who is responsible for death?

- Ernst (2002): 1995 – 2001 (Ernst, MD, PhD - UK)
- 42 cases reported in literature found
- 1 death attributed to forced rotational manipulation of a 3-months old baby girl by a physical therapist


Cervical Manipulation: who is Responsible for death?

- 200 cases
- no death attributed to manipulation by physical therapists

Type of Cervical Manipulation Associated with Injuries

- Any Rotation: 23%
- Tilt: 2%
- Traction: 1%


Cervical Manipulations - Risks

- Mechanical deformation of suboccipital vertebral artery associated with cervical spine rotation as a possible cause of compromised blood flow to the hindbrain and VBI
- “Avoid full-range or sustained cervical spine rotation in clinical practice.”


Cervical Manipulations - Risks

Most dangerous manipulations
C1-2 Rotation


How to avoid being at end ROM with HVLA manipulations?

- In order that the joint is not moved past its painless or 'normal' range of movement in any one plane, the joint is positioned in a combination of mid-range positions.
- HVLA thrust applied at end ROM of combination of plane movements but not at end of available range for each of the movements if they were to be applied in isolation.
- The use of these 'combined' movements produces the 'lock' position commonly referred to in osteopathic literature (Hartman 1985).


C1-2 Combined Rotation Manipulation

Chin hold technique  Cradle hold technique

Risk Factors and Neck Movements Causing Vertebrobasilar Artery Dissection

- 367 cases of Vertebral Artery Dissection
  - 57% males & 43% females
  - mean age of 39.3 years
  - 160 of spontaneous onset
  - 115 cases of onset after manipulation
  - 58 cases associated to trivial trauma
  - 37 cases of major trauma

Risk Factors and Neck Movements Causing Vertebrobasilar Artery Dissection

- Conclusion: no precipitating event found

Haldeman S. Kohlbeck F. McGregor M. Risk factors and Precipitating Neck Movements Causing Vertebrobasilar Artery Dissection After Cervical Trauma and Spinal Manipulation. Spine. 1999, 24(8);785-794


Risk Factors of Cerebrovascular Accident Associated with Cervical Spine Manipulation

- Haldeman (2002): CVA's due to cervical manipulations are unpredictable
- VBI testing unable to screen these patients at risk
- Any thrust technique should be preceded by informed consent and explanation to the patient that CVA symptoms are unpredictable, inherent, rare complication of cervical manipulation

Screening Guidelines - Cervical Manual Therapy

1. Inform the patient
2. Screen – rule out red flags
3. Document screening of the following via questionnaire:
   1. Dizziness
   2. Lightheadedness
   3. Nystagmus
   4. Impaired sensation to the face
   5. Blurred vision
4. Sustained Rotation for the above sx's
5. No thrust manipulation in the first session (because VBI symptoms are often delayed)
6. Monitor patient during all interventions and after all interventions

Mobilizations vs Manipulations

Summary - Cervical

- Evidence suggest no superiority of cervical manipulation over mobilization
- Careful screening
- Know the contra-indications
- Consent
- No end ROM rotation
- More research to find if subgroup of patients with neck pain could benefit from cervical manipulations
What about Thoracic Spinal Manipulations?

- Thoracic Manipulations for Neck Pain


Thoracic Manipulations for Neck Pain

- Thoracic spine manipulation results in immediate analgesic effects in patients with mechanical neck pain.


Thoracic Manipulations for Neck Pain

- Thrust vs non-thrust
- **Thrust mobilization/manipulation better short-term reductions in pain and disability** than does thoracic nonthrust mobilization/manipulation in people with neck pain.

Thoracic Manipulations for Neck Pain

- 78 patients with neck pain
- No association between the number of “pops” and improvement of pain, function and mobility of the cervical spine.


Spinal Manipulation for Thoracic Pain

- This pilot study suggests that spinal manipulative therapy for mechanical thoracic pain has greater benefits than placebo treatment.
- Weakness: small sample size

Thoracic Manipulation for non-thoracic symptoms

- Cervicogenic headache (RCT)
- Upper Extremity CRPS (case study)
  - Joint manipulation of T3 & T4 segments
- T4 syndrome (case study)


Complications of thoracic spine manipulations

- Thoracic epidural hematoma
- Esophageal rupture
- Thoracic disk herniation
- Esophageal rupture
- Pathological fracture


What about Lumbar Spinal Manipulations?

- There is no evidence that spinal manipulative therapy is superior to other standard treatments for patients with acute or chronic low back pain.


Lumbar spine manipulation: does it work?

- RCT comparing medication, acupuncture and spinal manipulation
- In patients with chronic spinal pain, manipulation, if not contraindicated, results in greater short-term improvement than acupuncture or medication.
- The data do not strongly support the use of only manipulation, only acupuncture, or only NSAIDS for the treatment of chronic spinal pain.

What about Lumbar Spinal Manipulations?

- Manual therapy significantly reduces low back pain.
- The level of pain reduction is greater than expected from placebo effects alone and persists for at least three months.


What about Lumbar Spinal Manipulations?

- The efficacy of spinal manipulation for patients with acute or chronic low back pain has not been demonstrated with sound randomized clinical trials.
- There are indications that manipulation might be effective in some subgroups of patients with low back pain.

Who benefits from lumbar manipulative therapy?

- Manual therapy, particularly manipulation, can be an effective modality when used to treat patients who have low back pain.
- A preliminary "profile" of the patient with low back pain who would likely benefit from manual therapy included:
  1. acute symptom onset with less than a 1-month duration of symptoms
  2. central or paravertebral pain distribution
  3. no previous exposure to spinal manipulation
  4. no pending litigation or workers' compensation.


Who benefits from lumbar manipulative therapy?

- CPR (Flynn, 2002)
- Refined by Fritz (2005)
  - symptom duration < 16 days
  - no symptoms distal to the knee


Fritz JM, Childs JD, Flynn TW: Pragmatic application of a clinical prediction rule in primary care to identify patients with low back pain with a good prognosis following a brief spinal manipulation intervention. BMC Family Practice 2005, 6:29.
Lumbar spine manipulation: does it work for discogenic pain?

- Lisi et al. (2005): systematic review
- HVLA Manipulation for symptomatic lumbar disk disease: more high-quality clinical trials using valid and reliable diagnostic criteria and outcomes measures are needed.
- Oliphant (2004): it is safe

Complications of manipulations of the lumbar spine

- cauda equina syndrome
- spinal epidural hematoma in patients undergoing anticoagulant therapy
- esophageal rupture
- disc herniation

References:


Spinal Manipulations for non-spinal pain: the Evidence

- There is insufficient evidence to support the use of manual therapies for patients with asthma.


Spinal Manipulations for non-spinal pain: the Evidence

- Manipulations for
  - Fibromyalgia
  - carpal tunnel syndrome
  - infantile colic
  - otitis media
  - dysmenorrhea and chronic pelvic pain
- Only very few randomized clinical trials exist.
- The claim that this approach is effective for such conditions is not based on data from rigorous clinical trials.

Spinal Manipulations in Infants and Children: No

- Serious injuries reported:
  1. subarachnoidal hemorrhage, paraplegia
  2. severe headache
  3. midback soreness
  4. delayed diagnosis: diabetes, neuroblastoma and/or inappropriate provision of spinal manipulation for serious medical conditions (ie, meningitis).

- Serious adverse events may be associated with pediatric spinal manipulations
- No rotation thrust manipulations before age 16


Summary

- Chiropractors, osteopaths and physical therapists perform spinal manipulations in the same fashion.
- The goals of their treatment differ somewhat
- No superiority of cervical manipulations over mobilizations
- Thoracic HVLA may be better for the management of patients with neck pain
- Lumbar spine manipulations in selected subgroup of patients
- Mobilizations and/or manipulations should be used in conjunction with education & exercises
- Careful screening
- Informed Consent when performing spinal manipulations
Thank you!

Questions?