Complementary and alternative medicine for neck pain: Focus on manipulative therapies-chiropractic and osteopathic techniques

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ABSTRACT
Neck pain is an extremely common symptom with a variety of potential etiologies. A significant number of patients are turning to complementary and alternative medicine therapies. In particular, chiropractic and osteopathic manipulation techniques are discussed. “Low quality evidence”, as per the GRADE system criteria used by the Cochrane Review, supports the beneficial effects of these treatments. Complications are generally benign and self-limited although occasional catastrophic consequences have been documented. Medical practitioners should familiarize themselves and their patients with the risks and benefits of complementary and alternative medicine in order to make informed decisions.

Keywords: neck pain, chiropractic, osteopathic, manipulation, complementary and alternative medicine

INTRODUCTION
Neck pain is a common and potentially difficult to treat problem. At any point in time, about 15% of adults are experiencing neck pain (Hellmann and Stone, 2007). In 2006, neck pain accounted for 13.2 million patient visits in The United States, or more than 1% of all healthcare visits to hospitals and physicians offices. Four out of five of these visits were comprised of patients between the ages of 18 and 64 with a slight preponderance of females at 58% (United States Bone and Joint Initiative, 2011).

Various studies have described the patients who are using complementary and alternative medicine (CAM) to alleviate pain. One cross-sectional study showed that about 23% were hoping to avoid invasive procedures, 34% were disappointed by conventional medicine, and about 50% were using CAM together with conventional treatments (Peleg et al., 2011). A cross-sectional study in Singapore concluded the prevalence of CAM use in those with chronic pain is higher than in a general population. Reasons for CAM use included fewer side effects and lower costs (Tan et al., 2013).

An analysis of the 2002 - 2008 Medical Expenditure Panel Survey showed that CAM-utilizing patients did not add to the overall medical spending in a nationally representative sample with neck and back conditions. In fact, their adjusted annual medical costs were $424 lower for spine-related conditions and $796 lower for total health care expenditures compared to non-CAM users. These differences were primarily due to lower inpatient expenditures (Martin et al., 2012).

Conventional medicine offers a variety of treatment options including pharmacotherapy, physical therapy, injections, and surgical procedures. Most demonstrate modest efficacy at best or have associated risks. Patients turning to CAM for neck pain have a seemingly overwhelming number of options to choose from. This article focuses on some of the manipulative therapies that are available and discusses the current evidence-base so that patients and providers can make informed decisions.

Chiropractic
The use of provider-based CAM therapies, such as chiropractic, has been increasing (Su and Li, 2011). The 2008 prevalence for chiropractic use was estimated at 5% (Zodet and Stevans, 2012). Chiropractic care includes, although is not limited to spinal manipulative therapy (SMT). Chiropractic care also includes rehabilitative exercises, ice, heat, ultrasound, and lifestyle modifications among other modalities. For purposes of this review, the role of SMT for neck pain will be discussed.

Various types of SMT have been described, including unloaded spinal motion, manual repetitive oscillations, and high velocity low amplitude (HVLA) manipulation. SMT seeks to restore proper joint mechanics in order to decrease pain and stress on the surrounding tissues. Unloaded spinal motion involves continuous passive motion delivered by motorized tables and application of flexion-distraction techniques. HVLA involves delivering a high velocity low amplitude thrust within a joint’s range of motion to correct subluxations. There is no current triage system to select a technique, although individual practitioners consider factors such as the patient’s age, diagnosis, and body habitus (Triano, 2001).

Effects of SMT have been documented. EMG of the deltotoid muscle (supplied by C5 and C6 nerve roots) showed small increases in amplitude and fatigue resistance following C5/C6-targeted manipulations (de Camargo et al., 2011). In an NIH study, 12 weeks of SMT significantly reduced participant-reported pain compared to medication at follow-up intervals between 8 and 52 weeks. Comparing SMT to home exercise program with advice showed no significant differences. One
caveat to this study’s conclusions is that participants and
providers were not blinded (Bronfort et al., 2012). For those
who are uncomfortable with neck manipulations, thoracic spine
manipulation may provide short-term improvement for those
with mechanical neck pain (Cross et al., 2011). A 2010
Cochrane review concluded that there is “low quality evidence”
that either cervical manipulation or thoracic manipulation can
reduce neck pain. This study used the GRADE approach of
rating quality of evidence where “low quality evidence” is
defined by “further research is very likely to have an important
impact on our confidence in the estimate of effect and is likely
to change the estimate”. This GRADE system classifies level of
evidence as “high quality evidence”, “moderate quality
evidence”, “low quality evidence”, “very low quality evidence”,
or “no evidence” (Gross et al., 2010).

Adverse effects of SMT are also generally benign and self-
limited. The most common are local discomfort, headache,
tiredness, or radiating discomfort, which usually resolve within
24 h (Senstad et al., 1997). The more ominous risk of
vertebrobasilar artery (VBA) stroke is often cited by opponents
of SMT. The incidence has been estimated between 1 in
200,000 (Michaeli, 1993) to 1 in a million (Haldeman et al.,
2002). The frequency of VBA stroke associated with
chiropractor visits, however, may not be any different than for
primary care doctor visits (Cassidy et al., 2008). These rare
events pale in comparison to non-CAM therapies commonly
recommended for musculoskeletal conditions including non-
steroidal anti-inflammatory drugs (NSAIDs). For example, the
risks of manual treatments for neck pain have been noted to be
safer than those associated with oral non-steroidal anti
inflammatory medications (Dabbs and Laurreti, 1995).
Clinically significant upper gastrointestinal episodes occur in 1
- 2% of patients who take NSAIDs; annual deaths in the United
States have been estimated 3,200 to 16,500 (Cryer,
2005).

Osteopathic

Osteopathic manipulative treatment (OMT) is another CAM
modality used in the treatment of neck pain. Andrew Taylor
Still founded the first school of osteopathy in Kirksville,
Missouri (1892) (Trowbridge, 2007). He had worked as a
hospital steward in America’s Civil War, suffered the death of
his own children from spinal meningitis, and eventually
became disillusioned with the poor outcomes of conventional
medical and surgical treatments of his time. Osteopathy is
based on the core principal that the body is capable of
maintaining and healing itself. Osteopathic physicians or
osteopaths use a variety of techniques, such as HVLA thrust,
soft tissue manipulation, and muscle energy techniques to
overcome biomechanical barriers to self-healing. While
osteopathy is considered a distinct discipline, there is some
overlap with chiropractic, such as both employing HVLA
techniques. A 2005 meta-analysis and systematic review of
OMT for low back pain concluded that OMT significantly
reduced low back pain (Liciardone et al., 2005). Significantly
fewer studies have examined OMT for neck pain.

McReynolds and Sheridan’s randomized trial on the
treatment of acute neck pain in the emergency department
compared OMT to intramuscular injection of 30 mg of
eketorolac. Both treatment groups showed a significant
reduction in pain intensity, and OMT showed significantly
greater reduction in pain intensity compared to the injection.
The main limitations of the study were the lack of blinding and
placebo. The authors maintained that a proper sham or placebo
manipulation does not exist. A placebo would have to cause no
biomechanical effects while at the same time appearing valid to
patients (McReynolds and Sheridan, 2005).

Martinez-Segura et al showed that a single cervical HVLA
manipulation significantly reduced neck pain and improved
active range of motion compared to a control mobilization
technique 5 min post-treatment. Patient inclusion criteria
included a lateral gliding test to establish the presence of an
intervertebral joint dysfunction at C3 - C4 or C4 - C5 levels
(Martinez-Segura et al., 2006). A case series study
demonstrated a significant reduction in mechanical neck pain,
although no significant changes in cervical range of motion,
both immediately and at 48 h following a single thoracic
HVLA manipulation (Fernandez-del-la-Penas et al., 2007).

While the literature on OMT for neck pain is sparse, a
handful of studies suggest rapid pain reduction and range of
motion improvements. If manipulative therapies are to gain
scientific validity above and beyond the powerful placebo
effect of the laying of hands, more high quality research is
needed. In particular, the development of sham manipulation or
control protocols is a unique challenge inherent in manipulative
medicine research. Sham manipulations have been employed in
low back research and the development of validated sham
cervical manipulation protocols is needed. For example, Brose
et al. (2013) have begun developing sham protocol for cervical
strain-counterstrain research. Liciardone and Russo (2006)
have elucidated the difficulty blinding research trials even
when sham manipulations are used as placebo controls. When
comparing written descriptions of sham treatments versus OMT,
research subjects consistently determined OMT to be the more
valid treatment.

Risks involved with OMT remain very low. OMT appears
to be safe in children when performed by qualified practitioners.
No treatment-related complications were noted in a
retrospective review of the medical records of over five
hundred children (Hayes and Bezilla, 2006). In the
McReynolds and Sheridan trial, one OMT patient noticed the
arm felt “funny” after the treatment intervention. The patient
had no abnormal neurological signs on physical examination.
In the ketorolac group, 8 patients had a variety of adverse
reactions, including arm soreness as one of these reactions. The
authors commented that the true incidence of complications
when using OMT on the neck is unknown, although is probably
similar to that described in the chiropractic literature
(McReynolds and Sheridan, 2005).

The effects of manual therapies on skeletal muscle can also
be understood at the molecular level. Skeletal muscle, through
the process of mechanotransduction, translates mechanical
forces into biochemical signals, which influence protein
expression. For example, muscle responds to overload by
adding sarcomeres in parallel (muscle hypertrophy). Similarly,
following skeletal muscle strain or injury, inflammatory
cytokines are released. Pro-inflammatory cytokine levels of
TNF-alpha and interleukin-6 were decreased in muscle biopsies
taken from human subjects receiving massage to exercised
quadiceps muscle (Crane et al., 2012). These cytokines are
thought to play a role in the development of acute and chronic
pain states. Cytokine expression also determines differentiation
of immune cells, or macrophages, into their M1, or pro-
inflammatory phenotype (Lawrence and Natoli, 2011). Manual
therapies, such as massage, are accompanied by a decrease in
the amount of M1 macrophages and an increase in M2, or anti-
inflammatory type macrophages that encourage tissue repair
(Banker, 2013). Further research could also compare and
contrast the biochemical effects of various types of manual
therapies.
Other techniques

Having originated in America, chiropractic and osteopathic manipulative techniques are well-known and widely practiced in the authors' country. As CAM continues to globalize, patients and physicians are confronted with having to evaluate techniques from around the world. English-language publications on cervical manipulation techniques from non-English-speaking countries are scarce, although some studies do exist. For example, a recent study by Lin et. Al examined the effects of Long's manipulation, a traditional Chinese medicine manipulation technique. This technique is not to be confused with other forms of traditional Chinese medicine, such as herbal remedies and acupuncture, which are beyond the scope of this article. Patient's undergoing eight 20 min sessions of Long's manipulation showed significantly improved neck pain intensity, reduced neck disability, and improved patient satisfaction compared to traditional Chinese massage techniques both immediately and at short-term follow-up. The manipulation used in this study involved neck flexion until tension was palpated. Then, neck rotation was performed to the patient’s range of motion endpoint (Lin et al., 2013). Low quality evidence (as per the GRADE system) suggests that compared to seated cervical traction, Chinese manipulation produced more immediate post-intervention pain relief (Lin et al., 2012).

CONCLUSION

Utilization of provider-based CAM therapies has been on the rise. “Low quality evidence” (as per the GRADE system used by Cochrane Review) has demonstrated the beneficial effects of manipulative therapies for neck pain. While there are likely more numerous techniques utilized by therapists around the world than are described in the literature, the lack of a valid placebo manipulation seems independent of the specific type of manipulation being studied. Despite difficulties inherent in manipulative therapy research protocols, clinicians can be reassured that the risks involved in manipulation therapies are generally lower in incidence than for conventional allopathic medical treatments for neck pain. Such risks have occurred, though, and patients and clinicians should make informed risk-benefit decisions on a case-by-case basis.

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CONFLICT OF INTEREST

The authors have no conflicting financial interests.

REFERENCES


