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Commentary

HVLA thrust techniques: What are the risks?

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Abstract

High velocity low amplitude (HVLA) thrust techniques are amongst the most commonly used manipulative treatment techniques used by osteopaths. HVLA thrust techniques are considered potentially more dangerous when compared to non-impulse mobilisation type techniques because of the application of a rapid thrust or impulse. This has led to concerns as to the appropriateness of using HVLA thrust techniques in certain regions of the spine and in certain spinal pain presentations. Considerable research has been undertaken on both the effectiveness and potential adverse reactions arising from HVLA thrust techniques. This paper reviews the literature regarding the nature and incidence of transient and the more serious non-reversible impairments associated with the use of HVLA thrust techniques. Consideration is given to the efficacy and appropriateness of pre-manipulative vertebrobasilar artery screening protocols and suggestions are given as to ways in which practitioners may reduce perceived risk.

Keywords: High velocity low amplitude (HVLA); Thrust techniques; Vertebrobasilar insufficiency; Risk; Disc herniation; Informed consent

1. Introduction

In clinical practice high velocity low amplitude (HVLA) thrust techniques are amongst the most commonly used manipulative treatment techniques used by osteopaths.[1] Most patients do not experience significant adverse events following the use of these techniques but HVLA thrust techniques are commonly perceived as being potentially more dangerous when compared to non-impulse mobilisation type techniques because of the application of a rapid thrust or impulse. Most research has therefore been undertaken on the adverse reactions arising from HVLA thrust techniques, but it is acknowledged that all therapeutic interventions carry an element of risk. Adverse reactions can be classified as (1) transient, (2) substantive reversible impairment and (3) serious non-reversible impairment.

Transient side effects resulting from manipulative treatment may remain unreported by patients unless post-treatment patient feedback is explicitly requested. Prospective studies report common side effects resulting from spinal manipulation occur between 30% and 61% of patients.[2–4] Commonly encountered transient side effects include local pain or discomfort, headache, tiredness/fatigue, radiating pain or discomfort, paraesthesia, dizziness, nausea, stiffness, hot skin and fainting. Less common transient reactions include early or heavy menstruation, epigastric pain, tremor, palpitation and perspiration.[5] These transient side effects usually begin within 4 h of receiving treatment and typically resolve within the next 24 h.[4] A study of Australian manipulative physiotherapists reported that most adverse effects associated with examination or treatment of the cervical spine arose as a result of passive mobilising and examination techniques ahead of high velocity thrust techniques.[6] Adverse effects were reported at one per 100 therapist weeks for cervical traction and other cervical techniques and one per 177.5 therapist weeks for high velocity thrust

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techniques. The rate for high velocity thrust techniques was estimated as one adverse effect per 50,000 high velocity thrust procedures.

Substantive reversible impairment following the application of HVLA thrust techniques includes intervertebral disc herniation, frank disc prolapse, nerve root compression and fracture. Osteopaths regularly treat patients with spinal pain and as the exact aetiology of the pain remains unknown in a large percentage of these cases it is likely that osteopaths, along with other manual therapy disciplines, frequently apply HVLA thrust techniques to patients who may have symptoms arising from disc derangements. While the use of HVLA thrust techniques in these circumstances remains controversial, thrust techniques are cited as a treatment option in a number of texts[7–10] and are probably used judiciously by many osteopaths as part of their overall management plan in patients with symptoms attributable to disc derangement. Research literature lends some support for this approach. One study of 27 patients with MRI documented and symptomatic disc herniation of the cervical and lumbar spine reported that 80% of subjects achieved a good clinical outcome from chiropractic intervention. The author suggests that chiropractic care including spinal manipulation may be a safe and effective treatment approach for patients presenting with symptomatic cervical or lumbar disc herniation.[11] In a single-blind randomised clinical trial comparing osteopathic manipulative treatment with chemonucleolysis for 40 patients with symptomatic lumbar disc herniation confirmed by imaging, a statistically significant greater improvement for back pain and disability was recorded in the first few weeks in the group of patients receiving manipulation. At 12 months the outcomes from both interventions were comparable with manipulation being less expensive. The authors conclude that osteopathic manipulation can be considered as an option for the treatment of symptomatic lumbar disc herniation.[12] While HVLA thrust techniques are undoubtedly applied safely to patients with disc derangements there are case reports of a ruptured cervical disc[13] and lumbar disc herniation progressing to cauda equina syndrome following manipulative procedures.[14,15] What is not known in these case reports is whether the disc herniation would have progressed without manipulation, whether a high velocity thrust technique was the only intervention used or whether the force and torque of a HVLA thrust technique or other mobilising techniques were a factor in the final outcome. A systematic review of the safety of spinal manipulation in the treatment of lumbar disc herniation reported the risk of a patient suffering a clinically worsened disc herniation or cauda equina syndrome following spinal manipulation to be less than 1 in 3.7 million.[16]

Not surprisingly, in relation to safety and the use of HVLA thrust techniques, most attention has been focused upon serious non-reversible impairment and potential serious sequelae resulting from cervical spine manipulation.

There is wide variation in estimated serious adverse reactions arising from cervical manipulation. Various authors have attempted to estimate the incidence of iatrogenic stroke following cervical spine manipulation.[17–29] Estimates vary between one incident in 10,000 cervical spine manipulations to one incident in 5.85 million cervical spine manipulations. Rivett and Milburn[28] estimated the incidence of severe neurovascular compromise to be within the range 1 in 50,000 to 1 in 5 million cervical spine manipulations. Other authors estimate complications for cervical spine manipulation to be 1.46 times per 1 million manipulations[30] and 1 case of cerebrovascular accident (CVA) in every 1.3 million cervical treatment sessions increasing to one in every 0.9 million for upper cervical manipulation.[25] Dvorak and Orelli[19] report a rate of one serious complication per 400,000 cervical manipulations while Patijn[27] recorded an overall rate of one complication per 518,886 manipulations. The published research unfortunately does not make clear the type of neck manipulation techniques used or the competence and training of the practitioner.[31] Magarey et al. in an attitudinal study of Australian Manipulative Physiotherapists, who are required to undertake specific postgraduate study in manipulative therapy, reported no major complications in 4601 physiotherapist years of manipulative/musculoskeletal practice.[6]

Several authors claim that published estimates may not accurately reflect the true incidence of serious cervical spine complications.[26–28,32] The frequency with which complications arise in patients receiving cervical spine manipulation will likely remain an estimate as the true number of manipulations performed and the numbers of patients receiving cervical manipulation remain unknown.[33] Haldeman et al. indicated in relation to vertebral artery dissection that a database of multiple millions of cervical manipulations would be necessary to obtain accurate statistics.[34]

While the osteopathic profession remains concerned about the potential for vertebral artery dissection following manipulation, we must remain cognisant of the fact that vertebral artery dissection does not only result as a complication of cervical manipulation but can also arise as a complication from normal neck movements and trivial trauma.[34,35] Indeed, patients may present to a practitioner with symptoms attributable to an ongoing vertebral artery dissection. Haldeman et al. reviewed the published literature to assess the risk factors and precipitating neck movements causing vertebrobasilar artery dissection. Three hundred and sixty-seven cases were identified, of which 252 were either of spontaneous onset, or related to trivial or major trauma. Less than one third of cases (115) were associated with cervical manipulation (Table 1).[34]