RESEARCH ARTICLE

Lower Cervical and Upper Thoracic Mobilisation in the Horse. Manual Therapies are Dose Dependent and an Increase in Patient Mass is Normally Associated with an Increase in Dose.

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Abstract

Numerous manual therapy techniques have been developed to deal with musculoskeletal pain, stiffness and associated spinal joint restrictions or loss of range of movement. Cervical vertebral mobilisation under anaesthetic was one of these. It was specifically developed to deliver an adequate and maintained dose or pressure when attempting to restore lost range of movement in the lower cervical and upper thoracic joint complexes of the horse. There was however a perceived reluctance amongst clinicians to explore this approach. They understandably preferred to utilise modalities that they were more comfortable with even though these were less likely to deliver a therapeutic dose.

Keywords: Manipulation, Mobilisation, under anaesthetic, under-dosing

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Introduction

Manual therapies, as with pharmacological agents (medicines) are dose dependent. Medicines have three dosage components. The strength of an individual therapeutic dose , dosage frequency and total number of doses. The individual dose is usually patient mass/weight dependent, whilst frequency and total number of doses are not.

This principle also applies to both mobilisation and manipulative procedures in terms of the force being applied, frequency and total number of treatments. Where stiffness or loss of range is being addressed, the applied force or dose must be sufficient to initiate movement through this restricted range of movement. Spinal procedures, where a momentary force is applied (high velocity thrust HVT) or a force maintained for a period to time (spinal mobilisation) which are being used to improve or restore lost range of movement, are also dose/force dependent [Snodgrass et al. 2014]. Dosage in human patients for both medical and manual therapies is in most instances mass dependent. The same applies in veterinary medicine. In most cases a larger individual dose is required to treat a larger mass, however dosage modifications are indicated where structural integrity is impacted by age or concurrent disease or degenerative processes. Where medical and manual therapies are being used concurrently dosages may require further adjustment.

To facilitate restoration of range of movement in horses where extreme pain or stiffness is evident, analgesia, sedation [Colles et al. 2014] and in some instances anaesthesia [Ahern 1994: Ahern 2019] are utilised to permit the required force or dose to be administered. Following the initial medication facilitated treatment, further treatment doses which are highly recommended , are usually delivered without the need for medical support.

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Therapeutic Dose

In manual therapy a dose usually refers to the application of a direct or indirect force or pressure, with the aim of restoring normal tissue or joint range of movement ROM. Accompanying this improved ROM is the expectation that any associated pain of either an orthopaedic or neural nature, will be significantly reduced and in some instances eliminated. This force or therapeutic dose will necessarily be that which firstly initiates movement through the reduced tissue or joint range. To achieve this it is imperative that forces other than those of an inherent structural nature, which directly oppose the administration of this therapeutic dose are minimised. Patient tension of a naturally protective nature and that derived from anxiety and apprehension is the most common opposing force

Mobilisation or Manipulation Under Anaesthetic

Manipulation under anaesthesia MUA is not uncommonly

used in human medicine where extreme stiffness and pain along with patient initiated resistance reduces the opportunity to restore pain free motion to a joint complex [Riazuddin et al. 2009: Kraal et al. 2018: Rotman et al. 2019] including the spine [Morningstar, Strauchman 2012: West et al. 1999] and more specifically the cervical spine [Herzog 1999: Hughes 1993: Davis 1996]. Critical reviews of these techniques, as is often the case with many manual therapies, are less common and vary in their outcomes [DiGeorgi 2013]. It was also generally accepted in human medicine that follow up passive motion therapy in the hands of a skilled therapist was often beneficial and in some cases essential [Kraal et al. 2019].

The Equine Cervical Spine

For many decades an area of the spine which lacked any detailed attention other than when fractures were apparent or when Wobblers syndrome, which was more recently referred to as Cervical Vertebral stenotic or Compressive Myelopathy [Donawick et al. 1989: Nout, Reed 20037] was diagnosed. This was to a large extent due to the limitations of available imaging. The introduction of digital radiography and its ready availability in general practice, along with access to computed tomography CT and magnetic resonance imaging MRI, has transformed our knowledge of this area of the horses anatomy. Research publications have escalated [Sleutjens et al. 2014: Bergmann et al. 2018: Dyson et al. 2019: Veraa et al. 2019: Haussler et al. 2019]. Speculation into the clinical significance of findings [Dyson et al. 2024: Veraa et al. 2019] along with investigations into both medical and physical therapies to treat these presentations had also accelerated [Riccio et al. 2018: Haussler 2016].

Inherent cervical ROM in the horse had also been investigated [Clayton, Townsend 1989: Hardeman et al. 2020]. Given its comparatively large ROM when compared to the rest of the spinal column, the significance of this ROM in facilitating free movement in the appendicular skeleton becomes apparent [Zsoldos, Licka 2015]. The relationship between cervical pain and loss of ROM in humans had been well documented [Rudolfsson et al. 2012] however this relationship had received less attention in the equid.

Cervical Vertebral Mobilisation Under Aneasthetic (CVMUA)

CVMUA [Ahern 1994: Ahern 2019] was developed to permit the application of a therapeutic dose or load to the lower cervical and upper thoracic vertebral joint complexes such that longer term reduced ROM could be addressed. Anaesthesia permitted the clinician to maintain a pressure or load whilst lost range was gradually acquired. Calculation of therapeutic dose , as was the case in human orthopaedic and spinal mobilisation in the anaesthetised patient, was a product of clinical learning from peers and personal experience. With anaesthesia pain and anxiety were negated and thus resistance other than that of a structural nature was absent. Research had shown that lateral ROM in clinically normal equine cervical joint complexes was between 25 and 45 degrees (except C1-C2) [Clayton, Townsend 1989]. In numerous CVMUA treated cases lateral joint range was reduced to between 5-10% and in some instances completely absent.

With CVMUA a clinician would apply a compressive force of up to 1200 Newtons (N) whilst an assistant would support the head/neck with a longitudinal tensioning force of up to 500-600 N. These forces were representative of those required to initiate movement through lost range. Force measurements in human cervical chiropractic adjustments [Russell et al. 2024] ranged between 177 N and 203 N whilst larger forces of up to 332 N were achievable in cadavers where patient resistance was negated [Symons et al. 2012].

Stringent guidelines with regard to CVMUA state that once movement is initiated, this force or pressure only is maintained whilst movement through range continues. There is no force or thrust applied at the end range. Once movement through range ceases, pressure is released and a new direction is explored [Ahern 1994: Ahern 2019]. There are other physical therapies used to treat cervico-thoracic spinal issues in horses [Haussler 2016] however none of these permit pressures of the magnitude used in CVMUA to be both applied and then maintained [Ahern 2020]. Adjunctive therapies along with both standing and under saddle stretching exercises are highly recommended post CVMUA to assist in maintaining newly acquired ROM. If correctly applied these can lead to improved range past that acquired during treatment.There has been only one anecdotal report of a horse in Europe being euthanised following a CVMUA performed by a veterinarian not trained in the discipline. Given that this singular case has been used as the basis for many not exploring this technique, it would be interesting to similarly exclude all current medical and surgical protocols on the basis of a singular catastrophic outcome. There have been - thousands of horses treated with CVMUA over a forty year period by experienced clinicians with no reports of serious iatrogenic issues associated with the treatment itself. One horse sustained a fracture of an accessory carpal bone during anaesthetic recovery [Ahern 1994].

The Brachial Plexus, Sympathetic Dystrophy and Radiculopathy

The brachial plexus which originates from spinal nerves C6 through to T2 supplies both somatic and autonomic innervation to the forelimb and muscles about the shoulder. Stiffness and loss of ROM in these joints can result in dynamic compression or overstretch of neural elements leading to specific clinical presentations in horses [Molle et al. 2024:Dyson 2011:Woods, Hillibrand 2015:Story et al. 2021].

It has also been suggested that alterations to sympathetic supply could result in sympathetic dystrophy like syndromes in horses with both neuropathic pain and vascular compromise impacting in particular the distal forelimb [Ahern 1996]. Increased sensitivity in the neural elements of the corium leading to a form of concussive lameness had also been postulated [Ahern 1995].

Discussion

If one is prepared to consider the logic of a therapeutic dose, then CVMUA should always be considered where significant pain and loss of ROM is present in the lower cervical and upper thoracic region of an equid or indeed any animal of a similar mass. Manipulative procedures that fail to firstly initiate and then maintain the pressure required to facilitate mobilisation in these large structures should be viewed as simply under-dosing.The apparent scarcity of professional persons who are prepared to investigate a procedure like CVMUA presents as a major hindrance to further investigations in this field. This issue appears to derive from the fact that most clinicians are both confident and comfortable with the clinical gains made utilising their specific disciplines. However if one is not prepared to at least observe and at best try new approaches, then how does one know and how does one progress.

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