CLINICAL APPLICATION OF CHIROPRATIC IN THE EQUINE PRACTICE (BACK PAIN, VISCERAL PAIN, AND LAMENESS)

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PAIN

The International Association for the Study of Pain's widely used definition states: "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage".[33]It is important to note that today we know the perception of pain is conceptual and has emotional components. It is always subjective, but may or may not be objective.[5]This is also true in the horse, where emotional centers in the limbic system of the brain play a strong and leading role in the horse's behavior. Horses experiencing pain may exhibit withdrawn social behavior and possibly experience a decreased appetite and decreased nutritional intake. (This is also important in the discussion of visceral pain and colic below.) 'Pain' begins as a noxious stimulus anywhere in the body. Nociceptors are neurons that respond to damaging, or potentially damaging, mechanical, thermal or chemical stimuli.[21]Whenfired, they send a pattern of electrical signals to the brain, where it is processed in many coordinating areas. The brain perceives the pattern of input and makes a response decision. Perceptions include nothing (thresholds are not met), itching, ticklishness or pain. Responses may be nothing, scratching, evasion, or fight and/or flight.

Sustained peripheral noxious stimuli can lead to spinal cord plasticity resulting in hyperalgesia, allodynia and spontaneous discharge of neurons. The pain symptoms may remain even when the original stimulus isstopped.[10,49]Windup, long-term potentiation and long-term depression are concepts describing this nociceptive plasticity.

Nociceptors also play an important role in the inflammatory response. Together with the sympathetic nervous system, efferent action in nociceptors create neurogenic inflammation.[36]This may explain why stressful conditions may exacerbate inflammatory conditions.[5]

The ability to perceive pain is critical to survival, but at times it is just as important to be able to modulate pain. Horses must be able to escape from a pack of wolves, even if injured. When the immediate threat has passed, the pain is perceived and may become severe or even immobilizing. A part of this modulation is when nociceptors fire into the cord they activate c-fos and c-jun which initiate the production of enkephalins and dynorphin. These endogenous opiates can play a part in inhibiting dorsal horn cells and gating pain.[27]Other modulation comes from descending pathways from the periaqueductal gray, ventral medullary raphe nuclei and the basal ganglia.[5]

BACK PAIN

"The condition of back problems in horses is frequently disregarded as a viable entity in veterinary medicine; ... As a profession, our task is to acknowledge that primary back problems do exist in horses. New models of human spinal rehabilitation include multidisciplinary approaches [integrative care] in the management of back problems. Advances in the treatment of equine back problems will incorporate some of the same philosophies." Kevin Haussler, DVM, DC, PhD

Sources of Pain

Local tissue damage can lead to direct activation of nociceptors. Chronic muscle pain can result from excessive stretch as in a traumatic accident, or, after the overload of a muscle during unaccustomed exercise. This is common during compensatory gait patterns due to lameness or poor biomechanics. If the nerves are also stretched, damaged or inflamed, radiating pain may result. Inflammation within the intervertebral foramen can cause irritation of the dorsal root ganglia and hyperalgesia of the foot as well as ongoing activity localized to the dorsal root ganglia.[26,39]Nociceptors in somatic tissue and the viscera can create referred pain in the back. These nerves fire into the wide dynamic neurons in the spinal cord which are designed to relate intensity rather than location.[32]

Example 1: Facet Syndrome

Facet syndrome is a condition in which there is an acute or chronic injury to one or more zygapophyseal joints, generally from excessive movement in one or more planes. It may include pinching or excessive stretching of the joint capsule. There is immediate discharge of nociceptors in the joint capsule.[16]This results in inflammation in the joint and surrounding tissue due to the release of noxious chemicals.[40] Since the effected tissues are paraspinal, diagnosis becomes difficult due to the diffuse bilateral nociceptive dysafferentation.[5]

Diagnosis

Back pain is more difficult to diagnose than other types of pain due to the divergent pattern of afferent nociceptors from the paraspinal structures. Nociceptors from limbs terminate ipsilateral; you need to know which hand to pull from the fire, and paraspinal tissue nociceptors terminate bilaterally.[15,16]Additionally, when nociceptors enter the spinal cord through the dorsal root ganglia and the dorsal nerve roots, they synapse at as many as 5 spinal cord segments cranial and caudal.[31]This leads to poorly defined areas of back pain, and the need for bilateral examination.

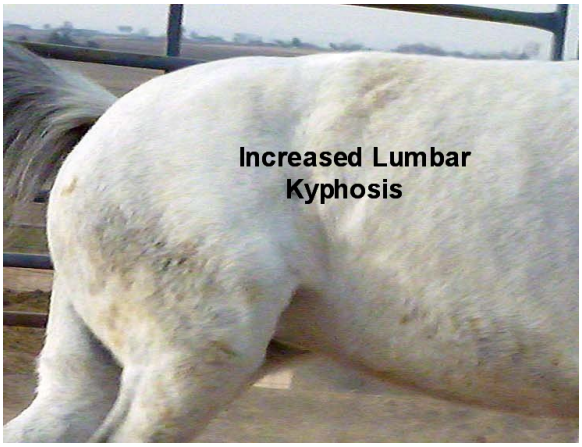
Animal chiropractors, with their knowledge of spinal anatomy and enhanced palpation skills, can be an important part of the diagnostic team when back pain is involved.

Treatment

The integration of chiropractic adjustments with the traditional methods of anti-inflammatory and pain medication with modified work has several advantages. One, substantial evidence suggests that stimulating mechanoreceptors inhibits nociceptor activity. The adjustment will help control the pain. Two, improving spinal mechanics will help direct the proper orientation of collagenous tissue during repair and aid in keeping stress off the injured segments.[5]And three, maintaining 'normal' movement in surrounding motion units will help insure normal afferent mechanoreceptive patterning in the constant neuronal pathways driving up-stream functions from gait to visceral function.[4,28]

Example2: Hypomobility of the L6-S1 Motion Unit

The lack of supraspinous ligament, the shape and orientation of the lumbar dorsal spinous processes and sacral tubercles, and the shape and orientation of the intertransverse joints assure that the movement of the equine lumbosacral motion unit is almost pure flexion/extension, with little or no axial rotation and lateral flexion. This is important for the transfer of energy created in the horse's rear limb and pelvis up the spine for forward ambulation. It is common for the L6-S1 motion unit to become hypomobile due to the tremendous amount of stress put on this transitional zone of the spine. As compensation, the lumbar spinal motion units become hypermobile, and the spinal flexors (the lumbosacral hypaxial muscles such as the psoas muscle groups) become overworked. This creates a shortening of the muscles and an increase in the kyphosis in the lumbar spine. The horse will still be able to walk, trot, and cantor, but only in a compensatory gait pattern. The longer this pattern persists, the more plastic it becomes. The added stress to the soft-tissue structures will eventually lead to lameness and pathology.



Diagnosis

Motion palpation may lead the animal chiropractor to a diagnosis of vertebral subluxation complexes in any of the lumbar vertebrae or sacrum.

Treatment

Spinal adjustments would primarily be aimed at correcting the hypomobilities, but in doing so, would also have the effects of restoring normal muscle activity, pain control, would help direct the proper orientation of collagenous tissue during repair and aid in keeping stress off the injured segments[5], and would return 'normal' movement in surrounding motion units to help insure normal afferent mechanoreceptive patterning in the constant neuronal pathways driving up-stream functions from gait to visceral function.[4,28]

Chiropractic, Back Pain and Research

There is a great deal of research that heightens the efficacy of animal chiropractic for back pain using meta-analysis, systematic reviews, and randomized controlled studies. Guidelines have also been established by consensus meetings.[11]Although these guidelines are established for the care of humans, like other forms of health care, it is not implausible that these guidelines would also be appropriate in the equine patient.

Equine back pain and chiropractic research is limited, but does exist.[13,17,24,42]Chiropractic care for horses has been discussed thoroughly in texts such as the Veterinary Clinics of North America, Equine Practice, Henson's Equine Back Pathology, Ross and Dyson's Diagnosis and Management of Lameness in the Horse and Back and Clayton's Equine Locomotion. It is also important to note that although current research has limited or varying results, no high level research has ever shown chiropractic to be contraindicated or of harm to horses.

VISCERAL PAIN

In spite of all the progress made in equine medicine in the last 30 years, colic is still considered the most common cause of death in adult horses, and accounts for a large proportion of emergencies for horse owners and veterinarians.[46]One reason for the high numbers is that colic does not refer to any one disease, but to any abdominal pain, of any origin or etiology.Many of the signs and symptoms of visceral pain such as curling the upper lip, refusing to eat, biting the flanks, looking at the abdomen, expressions of anxiety, or even kicking at the belly, rolling, pawing, and getting up and downfrequently are all descriptions of reaction to pain.[29,46]Visceral structures are highly sensitive to stretch, ischemia and inflammation, but relatively insensitive to other stimuli that normally evoke pain in other structures, such as burning and cutting. Visceral pain is diffuse, difficult to locate

and often referred to a distant, usually superficial, structure.[47]A 2003 meta-analysis of randomized clinical trials found that spinal manipulation was "more effective than sham therapy" in the treatment of pain.[1]
Regulation of motility of the gut is based on a complex interaction between central innervation, autonomic innervation, and the enteric nervous system.[19,30]The enteric nervous system is a collection of neurons in the gastrointestinal tract that control motility, exocrine and endocrine secretions, and microcirculation.[18]Coordination of all these systems is imperative in maintaining normal and balanced gut function.
Choosing the appropriate treatment requires knowledge about the physiology and pathology of equine gastrointestinal motility.[30]Chiropractic can be a part of that treatment regime, particularly in medical, non-surgical types of colic, such as distension gas colic or spastic colic, or simple obstructions such as feed impactions or entrapments. True chiropractic treatments, not other forms of manipulation or manual therapies, attempt to restore normal movement to the motion units in the spine and extremities. This provides the nervous system with thousands of normal input patterns from both mechanoreceptors and nociceptors, influencing the entire system to collaborate and equalize. The chiropractic treatment's goal is to help the nervous system recognize normal input patterns so that it can make better decisions in coordinating and normalizing output patterns to the viscera, thus helping to restore normal motility patterns in the gut.[6-9,12,22,38,43,44,48,50]Interestingly, anecdotal effects of chiropractic and colic have been both positive and negative. Some treatments have been reported to cause immediate, short lasting symptoms of colic.

Although chiropractic may have a place to play in the treatment of certain types of colic, more research is needed to define its role. Since colic is always potentially life threatening, a veterinarian should be called immediately when signs or symptoms are present, and any chiropractic treatment must be performed by a qualified doctor after discussing options with the primary veterinarian.

LAMENESS

There are four major biomechanical mechanisms in the horse; the stomatognathic system, the bow and string, the stay apparatus and the use of the body in ambulation called engagement. The function of these mechanisms is to conserve energy and to reduce stress on the soft tissue and bone that are part of the mechanisms. In other words, the anatomy of the horse has evolved to allow the horse to perform as we want, with as little stress and as efficiently as possible. Any deviation from 'normal' will put too much, or too little force on the structures involved. Over time, this asymmetrical and unbalanced use will cause the structures to fail, creating lameness.
Lameness is the most common cause of poor performance in sport horses.[34]In 1998 in the United States, $678,000,000 was spent on lameness, with $448 M on lost use, $195 M on vet bills, $35 M on death loss.[45]Lameness typically results from pain associated with the musculoskeletal system, including abnormalities with joints, bones, tendons, ligaments and muscle. The majority of cases of lameness are localized to areas within the distal limb; however, the sources, causes and locations of lameness are diverse. Lameness can be caused by numerous and diverse conditions, including but not limited to wear-and-tear, overuse, and trauma. The diagnostic approach to lameness in horses should involve consideration of the signalment (age, breed and sex), pertinent medical history, past and present use of the horse, physical examination, lameness evaluation and ancillary diagnostic procedures.[34]

Today, traditional methods of diagnosis and treatment protocols rely on pain and inflammation. Gait analysis, blocking, palpation, hoof testers, flexion tests, etc. all rely on pain and inflammation. Treatment most often centers on anti-inflammatory medication, joint support (which may be from medicine to good shoeing), and decrease in activity. Positive results are when the patient appears to be going without pain or apparent 'lameness' and they are released from care.[2,3,37]What about the horses that don't respond; the ones that have no apparent pain signs on examination; or, the ones that come back?

Chiropractic treatment focuses on the biomechanics of the whole horse. A chiropractic examination and treatment examines every joint in the spine and extremities.[14,35]By doing this, the horse becomes more balanced and symmetrical. The well-trained chiropractor focuses on the before mentioned biomechanical mechanisms, attempting to assist them to become as efficient as possible. He does this while working with the primary veterinarian who attempts to alleviate any of the damage to the structures that are present do to the prolonged abnormal stresses on these structures.

Example: Poor Engagement and Front Suspensory Apparatus Pathology
Below is a picture of a horse with a very common posture. Standing on a level surface the stay apparatus should be engaged and the muscles of her body should be relaxed and flaccid. There is a dip in front of the withers giving the appearance of a neck set on too low, the back is becoming lordotic except over the lumbar spine, there is wasting in the gluteal muscles and she has her weight shifted forward with her front legs underneath her. This is a perfect example of a horse that is not engaging (collecting) well, has difficulty going forward, will not frame properly, is not using her bow and string and has severe problems with her stay apparatus that will eventually lead to front suspensory apparatus pathology, including flexor tendon damage, suspensory desmitis and even navicular syndrome. A biomechanist can tell this just from the photo. That is the advantage of studying the biomechanical systems of the equine. What he cannot tell you is what came first, the chicken or the egg. All of the above problems must be addressed and managed.

Diagnosis
This is the typical non-patient. The horse may begin to have difficulty performing, the farrier may be struggling to repair long toes and under-slung heels and the rider may start to become frustrated, but they won't seek care from the veterinarian until someone discovers lameness, and that is when it is usually grade 2 or 3. Animal chiropractors, with their knowledge of spinal anatomy and entire equine biomechanical systems can be an important part of the diagnostic team when a horse like this presents itself at the front door.

Treatment
Traditional diagnosis may be high suspensory desmitis, tendon strain, etc. and care would include anti-inflammatory medication and altered work patterns until the pain, hence lameness, disappears. Then the horse is returned to work, many times reappearing at the clinic some months later with a relapse. This is because the compensatory gait patterns have been present for so long, the neural pathways have plasticized, and now recognize the compensatory patterns as normal.
The integration of chiropractic adjustments with the traditional methods of care would again have many advantages. The first would be to adjust the spine, bombarding the nervous system with normal patterns of movement in an attempt to 'wake-up' the old, correct patterns. This is like getting on a bicycle after 20 years. It doesn't take long for the old plastic pathways to wake-up because they were set when you were young and your nervous system was still developing. The horse also has patterns hard-wired into his nervous system and stored in the central pattern generators in the spinal cord. This treatment of the hypomobile segments with stimulation of the old neuronal pathways is one of the best ways to repair the ineffective biomechanical systems and get the horse back on the road to long-lastingreparation.

Remember that the adjustments will also help control the pain, help direct the proper orientation of collagenous tissue during repair, aid in keeping stress off the injured segments[5], and maintain 'normal' movement in surrounding motion units helping to insure normal afferent mechanoreceptive patterning in the constant neuronal pathways driving up-stream functions from gait to visceral function.[4,28]

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