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IMPACTS OF SPINAL LESIONS IN PERFORMANCE HORSES

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Thesis

By

Leslie-Anne Kennedy

IMPACTS OF OSTEOPATHIC SPINAL LESIONS IN PERFORMANCE HORSES

Background

Are the asymmetries described by so many masters of horsemanship truly caused by natural one-sidedness, or are osteopathic spinal lesions at play, either as primary or secondary sources? This thesis examines alternate possibilities for crookedness in the horse. Performance difficulties may be caused by osteopathic spinal lesions and not necessarily by horses being naturally one- sided.

The primary aim of this paper is to reflect on the challenges Type 1 and Type 2 osteopathic spinal lesions have on elite level performance horses as an alternative root cause to the horse simply being considered as having a naturally weak or dominant side, or viewed as being better on the right side or left side by riders. Throughout this dissertation asymmetry refers to laterality, one- sidedness, crookedness, or handedness so often described by the riding masters throughout history.

Type 1 and Type 2 lesion patterns are lesions of dysfunction identifiable through a series of visual observations while the horse is in neutral position, walked and trotted out in hand or shown under saddle. Palpations are necessary to further determine tissue differences, areas of pain, inflammation, myofascial restrictions or other abnormal musculoskeletal findings which may be indicative of osteopathic spinal lesions Type 1 and Type 2 lesion. T.A.R.T. (tenderness, asymmetry, restricted range of motion and tissue texture changes) is used for diagnosing somatic

dysfunctions. Neurological, vascular, muscular and restricted range of motion are important parts of the equation in the assessment.

Osteopaths, therefore, are treating the whole body, not just the occurrence of the osteopathic spinal lesions. The body is considered as a single unit that includes all elements of vascular and lymphatic structures, myofascial elements, neurological components comprising of the central nervous system (CNS), peripheral nervous system (PNS), muscle, brain, spinal cord, automatic nervous system, peripheral nerves, neuromuscular junctions, nerve roots, neurotransmitters and sensory organs. Hormones and enzymes are part of the whole unit.

(Canadian Osteopathic Centre, 2023)

There is often a cross over of the 2 patterns, frequently a Type 1 pattern developing into a Type 2 lesion pattern over time. Proprioception deficits may also be present in lesion patterns.

Before addressing performance difficulties during the movements discussed later in this paper pertaining to the idea that osteopath spinal lesions may be involved in crookedness, it is important to be familiar with the three laws of spinal motion developed by Harrison Fryette in 1918.

These laws of motion which are used in assessing osteopathic spinal lesions have remained in use for over 100 years. The first two laws concern the thoracic and lumbar regions. Law three involves the entire vertebral column.

1. When the spine is in a neutral state in the sagittal plane, sidebending and rotation occur in the opposite directions.
2. During flexion and extension, the vertebrae sidebends and rotates in the same direction.

3. Motion away from a neutral position in one plane of motion in a vertebral segment motion will also reduce the movement in other planes of motion. **(Fryette, on line)**

A performance horse case study by the author is included in order to provide a real life example of osteopathic lesions potentially causing poor performance, and to determine through osteopathic diagnostics, if lesions are present in this horse.

1. Introduction

This thesis examines the possibility that performance difficulties in the horse may not be due to natural sidedness, but rather Type 1 or Type 2 osteopathic spinal lesions.

The late Dr. Ridgeway expressed "Many, if not most, of the veterinary and farrier professionals are of a mind that asymmetry is the normal state and is associated with brain lateralization, creating a dominant side (referred to in the human as handedness). How much or what degree of asymmetry is normal, and how much asymmetry can be tolerated before deleterious changes in the biomechanics exist?" **(Ridgeway, 2016)**

Two osteopathic spinal lesion patterns, Type 1 and Type 2, will be explored using Fryette's three laws of motion. There is often a combination or cross over of both Type 1 Scoliosis lesion patterns and Type 2 lesion patterns occurring in a large number of horses. This observation was confirmed by Professor Stuart McGregor, DO, Director of Clinical Studies, London School of Animal Osteopathy, United Kingdom in answer to an email conversation dated October 18, 2023 with the author regarding lesion patterns **(McGregor, 2023)**

Numerous performance challenges can be seen accumulating throughout a high level dressage movement called the zig zag, or counter change of hand. The essence of the zig zag is

to combine all the elements of the movement incorporating the training scale as outlined by the Fédération Équestre Internationale (FEI). Straightness is number five on that scale. **(FEI Dressage Judges Handbook, 2017)**

It is often apparent that there is more fluidity, balance, collection, impulsion, cadence, and cross over in one direction, and less mobility in the opposite direction. Such an observation takes into account that the horse is under the guidance of highly accomplished and skilled rider.

The aforementioned movement is worth dissecting for it involves all the building blocks of the dressage training scale as set out by the FEI. Therefore, any kink in the building blocks, such as lack of straightness, perhaps caused by osteopathic spinal lesions, relates to a less than desirable performance and potentially affects all elements within in this complex movement.

The counter change of hand in canter is a series of half passes separated by flying changes, where the horse moves forward and sideways with collection, showing consistent, equal and symmetrical bend to both directions; demonstrating suppleness and fluidity while maintaining impulsion, rhythm, balance and cadence. The flying changes from one direction to the other must be expressive, without hesitation and cover ground over the same distance in both directions. It is important to note the zig zag is also performed in collected trot. **(FEI Dressage Judges Handbook, 2017)**

For centuries famous riding masters and trainers have identified and written about the challenges of asymmetries between the right and left side of the horse.

In dressage terms two types of straightness are described, ordinary and relative straightness. If straightness is considered in relation to the spine, it is referred to as ordinary straightness. On the other hand when the inside hind leg follows the track of the inside foreleg,

this is known as relative straightness; the horse is then considered straight. **(The Official Instruction Handbook of the German National Equestrian Federation, 1987)**

Alluding to the necessity for straightness, Zettl concludes that straightening a horse is an endless undertaking considering that every horse has some degree of crookedness. **(Zettl, 1989)** It is only when the horse is straight that horse's hind legs do not escape to the side. Straightness is absolutely necessary for collection and consequently for the correct carriage of the head and neck.

When the forehand is aligned with the hindquarters, meaning the longitudinal axis is in line on a straight or curved line, then the horse is considered straight. **(Podhajsky,1987)** Straightness includes the horse being able to bend and flex to the same degree on both reins.

2. Properties of Osteopathic Spinal Lesions Type 1 and Type 2

1. If a segment of vertebrae (a group of 3 or more) remain fixed in a neutral position this is considered, a Type 1 lesion. When the long restrictor muscles that cross over multiple segments of vertebrae are hypertonic, motion may be hindered in that particular group of vertebrae. T.A.R.T will be present in a Type 1 lesion.
2. Type 2 somatic dysfunctions occur when a single vertebra is fixed in the motion pattern of either flexion or extension. The mechanics of function will cause the anterior aspects of the vertebrae to come closer together (forward bending) and the posterior aspects of the vertebrae open up. In extension (backward bending) the opposite is true. The anterior aspects separate while the posterior aspects approximate (come closer together).

The rotator muscles are short restrictor muscles that are potentially hypertonic and generally cross over only one or two vertebra and therefore activate motion.

When examining an acquired Type 1 scoliosis osteopathic lesson pattern, observe that this is not a pathological issue or a deformed vertebra, but considered a pattern of dysfunction.

It has been recognized by McGregor that the neck plays a greater part in the lower paces of the walk and trot than in the canter. In exploring this type of lesion, if it is easier to bend the horse's neck to the left than to the right, it demonstrates the left neck muscles are shorter than the right. Therefore it is easier to create right sidebending in the thoracic spine. In sidebending to the right, the left hip will drop more, thereby contributes to creating right sidebending. Consequently, it can be said that the pattern of somatic dysfunction is similar to that of scoliosis.

Figure 1: As the spinous processes tip to the left, the ventral portion rotates to the right creating right sidebending. Photographer: Kennedy, L., 2023

When describing "rotation" the reference is to the ventral portion of the vertebra. As the spinous processes tip to the left, the ventral portion rotates to the right, creating what osteopaths refer to as right sidebending. Sidebending and rotation are to the same side.

Investigating Type 2 patterns with regard to poor performance, this pattern manifests in occiput-atlas restrictions, coxo-femoral joint dysfunction, medius gluteal margin reactivity and TMJ sensitivity. The Type 2 pattern lesion onset may be gradual over a period of time but should

not be mistaken for a lameness pattern. Cranial nerve XI, (CN 11), the accessory branch of the external branch exit may possibly become irritated, causing hyperreactivity of the thoracic trapezius muscle. The coxo-femoral joint dysfunction causes surrounding muscles to work harder, creating potential muscle bunching and hyper-reactivity. On the affected side the margin of the medius gluteus becomes reactive. The affected hip appears higher than the non-affected side.

Additionally, the horse with a Type 2 lesion pattern would most likely suffer from a proprioception deficit and may be head shy, difficult to flex through the poll and would hang on the rein on the side of restriction.

The coxo-femoral joint will be strained in this pattern causing muscle tightening to compensate for the strain, and may be mistaken for a true lameness. It should be acknowledged that the temporo-mandibular joint is an acupuncture point for the hip, hence an important assessment point of reactivity when evaluating a Type 2 lesion pattern.

With the Type 2 pattern, it could be concluded that as a result of a C1 fixation, rotation would occur by reason of the occiput atlas restriction, therefore creating irritation of the exit of the auxiliary branch of the accessory nerve cranial nerve XI, (CN 11). The accessory nerve is a motor nerve that controls head direction, the neck and supports the shoulder. The trapezius, withers and the brachiocephalicus would be irritable on the side of restriction.

A poor right canter strike off could validate that the horse exhibits a Type 2 lesion pattern recognizing the fact that the horse has a right C1 rotation fixation, sensitive left TMJ point, hyper-reactivity over the right trapezius, brachiocephalicus and right gluteal margins on palpation.

The right bend through the thoracic spine would be difficult. On circling or turning to the left, the horse will generally fall over the outside shoulder, in this example the right shoulder; when circling or turning to the right there would be little bend. **(Video - Stuart McGregor, London College of Animal Osteopathy)**

3. The Effects of Spinal Lesions on performance

Based on the theory of the discussed lesion patterns, when analyzing the challenges faced by performance horses in the counter changes of hand in canter, using the Type 1 Scoliosis lesion pattern, where the horse's neck bends easier to the left, and the thoracic and lumbar spine is sidebending left, the left counter change of hand would produce less angle and less bend than the right counter change of hand. The right hind limb comes more under the body, making the right canter work easier than the left.

The pivot point is at T12 of the dorsal group of vertebrae at the base of the withers. The pivot point is the point where the spinal curvature changes to the opposite shoulder and neck, therefore the neck would be able to bend more easily left from T12 forward. However, because the thoracic spine is in left side bending, the left hind limb of the horse pushes to the right instead of coming under and engaging. Therefore little bend would be possible through the left side of the mid section of the horse.

Using the same lesion pattern the opposite is true in the right counter change of hand; the neck would not be able to bend as easily, but the right side of the horse's body is is already prone to bending more to the right because of the shorter thoracic muscles on the right. The difficulty

would be to prevent the hind quarters from leading. In the counter change of hand to the left it would be difficult to create the same degree of angle and bend as to the right.

To take this a step further, during the counter change of hand, the flying change of lead would also suffer. It is possible that the flying change from the right to the left may be delayed, earthbound, cover less ground and considered less fluid. This is because in a spinal lesion pattern where the horse exhibits right sidebending, it is easier for the horse to canter on the right lead. The right hind limb is already placed more underneath the body of the horse but generally will not have the same power as the left hind limb to strike off into the new canter when changing from the right lead to the left. The left hind limb in this pattern pushes, instead of carries. Coupled with the difficulties of angle and bend it is easy to see how many challenges spinal lesions can create throughout an entire performance.

Figure 2: The difference in the heel height is substantial. Photographer: Kennedy, L., 2023

Moving on to the example of the case study performance horse, the obvious foot asymmetry can be seen from different angles. Figure 2 clearly illustrates a low heel/high heel syndrome with a high heel on the left fore foot and a very low underslung heel and long toe on the right fore foot.

The author assessed the case study horse visually in a neutral posture, in hand and under saddle. The scapula of the right fore limb presented with a straighter angle than the left fore limb. The left fore limb scapula was rotated to a greater angle.

The right shoulder appeared to be higher, more muscular and bulging when observed from behind and above the croup. The owner complained that the mare invariably travelled with the hindquarters to the left while on the left rein. The author observed when under saddle the horse was sidebending right, travelled with her hindquarters to the left while on the left and right reins in addition to her right shoulder bulging to the right while on the left rein. On the right rein, the right shoulder fell to the inside, with more weight being placed on the right fore. The rider confirmed the horse was more comfortable striking off on the left lead. **(Kennedy, 2023)**

In conjunction with osteopathic techniques, the foot will need to be monitored and addressed on a regular basis by an expert farrier to help improve balance and posture.

The question then arises, what came first? Was an unnoticed Type 1 spinal lesion present, causing the right forelimb over time to load more? Or was trauma to the foot, poor trimming or additional factors such as genetic reasons part of the equation?

According to the assessment protocols for osteopathic spinal lesion patterns as set out by McGregor **(McGregor, 2023)**, during the author's assessment for spinal lesions in the example of the case study horse, it was found that the left TMJ was hyper-reactive. The TMJ according to McGregor is an acupuncture point for the hip which may indicate a coxo-femoral somatic dysfunction. The right hip medius gluteus margin was reactive and a right occiput atlas restriction was present. A slight head tilt to the right, referring to the right ear being slightly lower than the left ear, was present suggesting a proprioceptive deficit was present.

The osteopathic diagnosis for this case is a Type 2 osteopathic spinal lesion. It is also worthy of mentioning there was a somatic dysfunction of the left cervical vertebrae C6 and C7. Furthermore the horse exhibited a lumbar sacral junction dysfunction.

Osteopathic Articular Balancing (OAB) techniques were used to specifically address the occiput and coxo-femoral dysfunctions with positive results. In addition OAB techniques were applied to the neck, lumbar, shoulder and ribs.

Ridgeway's findings have pointed out that Pat Thackery, a prominent and very well educated farrier from Idaho, observed that 60% of the horses in his practice have heel height asymmetries. What does it mean? Does it mean heel asymmetries are not a significant finding? Does it imply asymmetries are normal? Ridgeway further concludes that all horses with high/ low heel asymmetries are crooked and therefore are potential candidates for performance difficulties eventually leading to unsoundness.**(Ridgeway, 2016).**

4. Long Term Benefits of Osteopathy for the Performance Horse

Studies have been done in France indicating locomotion can be remarkably enhanced with Osteopathic Manual Therapy. Osteopathy has a very legitimate influence, principally with locomotion abilities in younger horses. Studies demonstrated increased dorso-ventral movement resulting in more elevation. Additionally the trot was directly affected by becoming more symmetrical. Enhanced propulsion was evident during the trot and canter work.

With regard to older horses with chronic musculoskeletal afflictions, it is necessary to take into account that it will take time to eradicate the layers of dysfunction which have accumulated over the lifetime of the animal. As the layers are removed, the horse's locomotion may seem to deteriorate before there is an obvious overall improvement. It takes time to establish a balanced posture following osteopathic manual therapy. Time must be given for the animal to adjust to the new postural changes. (**Dr. Isabelle Burguad, et. al., 2023)**

5. Conclusions

Osteopathy is a system of therapy based on the theory that the body is capable of making its own remedies against disease and other toxic conditions when the body's normal structural relationship has favourable environmental conditions and adequate nutrition. Osteopathy utilizes generally accepted physical methods of diagnosis and therapy, body mechanics and manipulative methods of detecting and correcting faulty structure. **(Dorland's Pocket Medical Dictionary)**

There are many reasons for disruption in the function of a spinal segment. Provocation could be trauma, bad training, ill fitting equipment, genetic abnormalities, poor posture, low heel/high heel syndrome, repetitive strain injuries, and degenerative conditions contributing to dysfunction. Somatic dysfunction may also be seen in young, growing horses.

Reflecting upon spinal motion and considering specifics of spinal rotation in the equine, it would be possible that lack of optimal fluidity in one direction, also referred to as sidedness, or laterality, may be in fact caused by an osteopathic spinal lesion. These patterns, whether primary or secondary sources, could be problematic not only in high level performance horses executing lateral movements, tempi changes, piaffe, passage, but also single track movements on straight and curved lines in all horses.

Osteopathic spinal lesions are perhaps the most problematic challenge for the elite performance horse and must be considered high on the list of somatic dysfunctions when assessing and treating competitive equine athletes in order to improve and restore optimal performance.

Osteopathic spinal lesions may be addressed, improved or eliminated through.osteopathic techniques.

REFERENCES

Burguad., Dr. Isabelle(et. al)., (equipedia, ifce 26 11 2023)
www.equipedia.ifce.fr/en)

Canadian Osteopathic Centre., History of Osteopathy, 2023, on line

Dorland's Pocket Medical Dictionary, Page 508 23rd edition, 1982 W.B. Saunders Company, West Washington Square, Philadelphia, Pa 19105
Indexed ISBN 0-7216-3166-5, PLAIN ISBN 0-7216-3167-3

FEI Dressage Judges Handbook, Guideline for Judging,, p 2., The Training Scale
Fédération Équestre Internationale, Switzerland, first edition. 2006

FEI Dressage Judges Handbook, Guideline for Judging, 2017., p 153
Fédération Équestre Internationale, Switzerland, first edition, 2006

Fryette's Principles of Spinal Motion, Basics for Medicine, Medicine MD/DO,Osteopathic Manipulative Medicine, Basics,
www.picmonic.com

Kennedy, L., 2023., Visual/Palpation Assessment, Photo credits Figure 1 and 2, Sept 20, 22, 2023, Student of the Equine Osteopathy Program, London College of Animal Osteopathy

McGregor, S., London College of Animal Osteopathy of Clinical Studies, United Kingdom October 18, 2023, email conversation with author., Paragraph 1

McGregor, S., London College of Animal Osteopathy, Director of Clinical Studies, United Kingdom, Equine Stream, Lecture Video, 2023

Podhajsky, A.,. The Complete Training of Horse and Rider., p., 46, 50-51
George G. Harrap, first edition, 1967. ISBN 0. 245. 59040. 4

The Official Instruction Handbook of the German National Equestrian Federation, 1987. Techniques of Riding, The Training of Horse and Rider in Advanced Dressage., Section 1 p 26. Half Halt Press, Box 512 Gaithersburg, MD 20878, ISBN 0-939481d-03-0, 1987

Zettl, W., Dressage In Harmony, 1989. Introduction to Advanced RidingChapter 8., p., 88. Half Halt Press, Inc. P.O. Box 67, Boonsboro, MD 21713 ISBN 0-939481-54-5