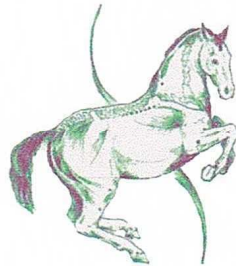


**Laterality: Manifestations and Nomenclature for
The “Crooked Horse Syndrome”
Kerry Ridgway, DVM ,
Equine Therapeutic Options
800horsedr@gmail.com**

URL: drkerryridgway.com

FaceBook: Dr Kerry Ridgway,
Equine Therapeutic Options



Since Xenophon, every riding master, expert trainer, and thinking rider recognizes that essentially every horse starts with a more difficult side, one side more concave and the other more convex. Most remain this way for their entire lives. They exist within the context of the “Crooked Horse Syndrome.” These *inherent* aspects create the biomechanics of movement of the “natural horse.” Such biomechanics serve the horse well in its natural wild/feral state, but are antagonistic to those required of the ridden horse. Because of this dichotomy, many techniques are utilized to “straighten” the horse. The essence and purpose of all the techniques, then and now, is to minimize limb dominance and develop the biomechanics necessary for riding horses. In essence, the goal is to make them more ambidextrous. *Failure to achieve ambidexterity, balance and straightness creates problems in performance, a shorter useful life and eventually leads to unsoundness.*

To quote Dr. Thomas Ritter: “Achieving functional straightness is one of the most fundamental demands in training horses, because a crooked horse will never be able to develop impulsion self carriage or lightness, not even to mention, collection. What is even worse is that a crooked horse is laterally and longitudinally unbalanced and will, therefore, not remain sound in the long run, as any imbalance creates stiffness and bracing which translate into unnecessary wear and tear on joints, tendons, and ligaments.”

For a number of years, I observed that *every* horse I examined, from a musculo-skeletal perspective, had identical patterns of muscle hypertonicity and pain upon systematic muscle palpation. *This pattern occurred in essentially every horse, regardless of*

discipline or use of the horse. Although the muscles involved in the pattern were consistent in all horses, about 20 percent of the time they manifested as a mirror image of the other 80 percent. There might be relationships of muscle size (hypertrophy and tone) according to use, but the “pain” and “tension” issues were, essentially, within the same sets of muscles in all cases. This obviously has to relate to how the horse uses the same muscles on one side of the body versus the other side. I had, for years, looked for, what had to exist i.e. a common denominator.

A few years ago, I had a “eureka” moment when first introduced to the concept of “Laterality.” I became intensely interested in learning more. Often described as dominance of one or the other side of the body, laterality is typically referred to, in the human-biped, as the state of being “right-handed” or “left-handed.” In the horse it has, for centuries, been defined as “the crooked horse syndrome.” Our coming to understand this syndrome is, in my opinion, absolutely *critical to every horse’s wellbeing, performance ability and long-range soundness.*

How did I come to be so passionate about *Laterality* and its key relationship to problems of performance, soundness, conformation and shoeing? My interest, initially, became piqued when Martina Steinmetz, a German Veterinary acupuncturist, presented acupuncture aspects and treatment of laterality at an International Veterinary Acupuncture Congress. Later, I got together with her and we had discussions about the asymmetry of the feet in the “high/low” syndrome, a favorite topic of mine. Could that condition be related to “Laterality?” My confusion, lack of knowledge and consequent disagreement about the role of laterality in gait and posture led my wife, Christine and me to research more of what is known about equine laterality and its relationship to “straightness training.” We extensively studied and discussed various materials. We read and dissected the Schöneich book, “*Correct Movement in Horses*” many times over. This led to our traveling multiple times to Germany to meet and spend time with Klaus and Gabriele Schöneich.

Klaus, as a rider and trainer, has been involved in “straightness training” horses for nearly 30 years and has developed and used his system of training on approximately 6000 horses. My wife, Christine, and I were absolutely captivated with the concepts that he expressed. They have enormous significance, not only to riders, but very importantly, to the pathology that I, and every veterinarian, observes day in and day out. We watched many horses improve in balance, and consequentially, in soundness, within the short span of the first visit of two weeks that we spent with Klaus and Gabriele.

I had the opportunity to do daily physical exam on these horses. I saw reductions in the muscle pain and hypertension of the muscles and patterns that were so familiar to me. The experience changed the entire focus of my veterinary medical practice. Thus, laterality became the “Ah-Ha” moment in my understanding as to why I was seeing those consistent muscle patterns. Furthermore, I came to understand that it matters not, whether you are a rider, a trainer, a veterinarian (conventional or integrative medicine oriented), a groom, a farrier/trimmer or a massage/physiotherapist, *nearly every musculo-skeletal injury or pathology that we identify and attempt to cure or manage is related to the*

“Crooked Horse Syndrome.”

The “Crooked Horse Syndrome” is part and parcel of the genetic quality called “Laterality.” Laterality is expressed as a “dominance” of one side of the body (associated with brain laterality). This is expressed, in common language, as being “right” or “left handed.” We have carried this handedness terminology over to the horse. This may be where different conclusions and nomenclature come into play. *Horses do not have “hands.” Humans are bipeds and horses are quadrupeds... different biomechanics come into play and the limbs are not used for the same functions.*

As a result my main goal has become educating the horse owning public as well as my veterinary colleagues to understand the how and why horses exhibit the crooked horse syndrome. They need to know how these horses can be brought into balance and straightness. It is such an enormous key to soundness. By way of client and horseman education, it has always been my goal to prevent and avoid so very many of the musculo-skeletal problems that I encounter day in and day out. Now I know why and have a much better understanding of how to help.

Before I turn to the manifestations of laterality, let me elucidate a few essential thoughts about muscles... I often, facetiously, refer to them as “not the brightest bulb on the tree.” By that, I mean that muscle physiology is based on a polarizing stimulation for contraction followed by depolarization and release. The release part does not occur in proper sequence in the case of overuse of muscles. This can occur as a result of a sudden excessively strenuous movement or series of movements. It can also be the consequence of extensive repetitive use of specific muscles - i.e. cumulative micro-trauma. (As a metaphor, think of carpal tunnel syndrome in the human. It is the culmination of many tiny traumas that become cumulative.)

Additionally there is a tremendous energy burn (ATP) associated with this prolonged contraction. *These muscles in our “crooked horse” fall into this chronically contracted and hypertonic state. This sets up markedly reactive points, i.e. acupuncture points (latent and active), as well as trigger points. Prolonged contraction sets up a state of chronic pathology.*

Manifestations of Laterality in the Equine:

For the purpose of this paper, I am going to consistently use the example of a horse whose difficult or harder side is, by the Schöneichs and my observations, the right side.

* I think we can all agree that, most commonly, the thorax feels concaved on one side and more bulged on the other (Which side *is not agreed upon by all riders.* I find this depends on stage of training and the “feel” of the rider. *Complicating factors, such conformation (e.g. a “bulging shoulder” creating questionable saddle fit), foot imbalances, sidedness and handedness of the rider all affect what they say they “feel.”*

* When starting a young horse it will tend to avoid left rein contact and be resistant and hang on the right rein.

* Typically most horses, when being started, have an easier time picking up a left lead than the right lead.

* When lunging the horse to the left most horses “pop- out” the right shoulder and exhibit the effects of centrifugal force - thus they keep widening the circle.

* The same young horse that is being started is reluctant to lunge to the right and will often stop and turn towards the trainer.

I find that those, that I refer to as “right forelimb dominant” have pain and hypertension in the neck muscles on the *right side*, but not on the left side (i.e. *Splenius* muscles, the *Omotransversarius* muscle, and likely the *Scalene* muscles). As I move back to the shoulder on the right side, I find marked tension in the *Deltoid* muscles, the *Trapezius* muscles, the *Ascending pectoral* muscle, and the *Serratus ventralis thoracis* muscle. I do not find these muscles to have excess tension or pain responses when the left neck and left shoulder are examined.

Not coincidentally, these tend to be the same sets of muscles that get more painful or damaged from overuse in a “right handed” human/biped. I also find more pain in the “wither pocket” (i.e. the *Trapezius* muscles and chiropractic issues involving the associated upper thoracic vertebrae.) These follow as a result of the shift in the center of gravity and “shear forces” to which they are subjected. Muscles only get to this state if they are the more used (and, perhaps, abused) set.

They have progressed from “tone” to a state of “hyper-tone.” If we are recognizing heavier muscle use present on the right shoulder and forelimb, we can logically describe this as a “muscle dominance” or “right forelimb muscle dominance.” This is to say, that, support, balance and propulsion also are important in a proper evaluation of how we define dominance.

As I move to the *right hindquarter* of what I am referring to as a “right forelimb muscle dominant” horse, I will find the right *Middle Gluteal* muscle very tense and reactive to palpation. The *Middle* and *Superficial gluteal* muscles are acting in this case as large “stabilizing muscles” that are providing hind leg support and stabilization for each stride. This is in contrast to “the mobilizer” muscles in this same right hindquarter. Mobilizers, in this case, create forward propulsion (i.e. The three hamstrings muscles). There is, most typically, only slight to moderate reactivity in these right-sided “mobilizers” such as the *Biceps femoris*, the *Semitendinosus* muscle and the *Semimembranosus* muscle. The logical conclusion is that most muscle activity in the right hind is being utilized as a base of support - both in stance phase and during movement.

There are pitfalls in equating human limb function with quadruped limb function. (More on this later.) However, there is value in looking at the human’s legs in the same evaluation context as horses hind limb muscles and stance. Picture the right leg stabilizing/supporting limb stance that a “right handed” human assumes when hitting a baseball or the right leg support in a boxer’s stance before striking at his opponent. In each of these examples, the person is poised and balanced to move quickly and

athletically.

In these instances the human is doing the same with his right leg as the horse is with its right hind leg. The left leg is poised to propel the batter or boxer forward. I find it interesting that typically, when we are discussing human laterality, we do so in terms of the arms and seldom recognize or discuss the characteristics of leg laterality.

Examination and evaluation of the *left hindquarter* reveals quite a different muscle pattern. The *Middle Gluteal muscle* is rarely reactive in our “crooked horse” since it is not having to assume excessive stabilization function. The hamstring muscles assume the action of propulsion and function as mobilizers in a “right forelimb dominant horse. The *Biceps femoris muscle*, the *Semitendinosus muscle*, and the *Semimembranosus muscle* are very reactive. *This is in very marked contrast to their degree of reactivity on the right side.* (On what we refer to as “left forelimb dominant horses,” the pattern in the hindquarters will be mirror imaged.) If the horse that has been adequately and properly “straightness” trained, the muscle patterns on both sides of the croup and thighs should exhibit size symmetry and similarity of tone and function as a mobilizer or a stabilizer as the phases of protraction and retraction are occurring.

This brings up a critical issue - when training for “straightness” is accomplished, diagonal balance is achieved. When the horse is on a circle, the outside hind limb can then function as the supporting and balancing hind limb. In forward motion, the outside leg and hoof needs to stay in line with the tract of the front foot. Thus, e.g. when our horse is asked to turn to the right, its right hind should now become the propulsive leg and the left hind become the supporting/balancing limb. In a correct and straight moving horse, the functions would immediately reverse as the horse turns to the left.

A right-handed person uses the right hand for the great preponderance of their arm/ hand needs. If we are right handed, we are quick and prone to use our *right* arm to balance ourselves if we trip or start to fall. If we do fall, we are more prone to break our fall with our *right* arm. We also are prone to weight our right leg in moments of insecurity or imbalance. All this emphasizes that a “right handed” person uses his dominant right shoulder and arm for BALANCE, and his dominant right leg for SUPPORT and STABILIZATION.

Think about the young right-handed gymnast, who at the end of the routine, somersaults off of the “horse,” and is expected to land with both feet evenly and firmly placed. Often you see a slightly off balance landing; the right foot has landed slightly ahead of the left because his/her center of mass (gravity) has shifted off center and to the right side. Then by instantly (and instinctively) slightly elevating the right shoulder/arm, support is quickly shifted to the left leg. At this point the gymnast can quickly bring the right leg/foot into proper supporting position and achieve a balanced stance. (We do the same thing as we start to fall.)

Now, however, let’s contrast the horse’s use of his front limb vs. the human’s use. As mentioned above, the right-handed human tends to use the right arm for *balance* and the right leg for *support*. The horse evolved as a grazing animal, designed to place more of its

weight on the forehand to facilitate grazing. Thus, both front limbs in the “natural horse” are used far more for SUPPORT and secondarily for balance until it needs to move to the next blade of grass. The front limbs, literally, act like “posts” to facilitate the grazing posture. *In this support function, does one forelimb provide more support and balance than the other? If so, which one?*

It is clear that the propulsive forces of the left hind (*in the non-straightened “natural” horse*) pass by the most direct route into the right shoulder. By this action, similar to the gymnast example, the horse’s center of gravity is shifted away from the midline to the right. So when the center of gravity is shifted to the right of midline in the unbalanced horse, more demand for support is placed on the right shoulder and limb than the left forelimb. Thus, the horse becomes more weight “dominant” on the right as the horse is propelled forward.

Using a biped as a metaphor, a “right handed” person can not throw a ball or kick a ball well if the right shoulder is pushed downward and the range of motion is restricted. This effect can also be felt by walking and turning while carrying a heavy water bucket or suitcase in the right hand.

With the right shoulder and limb weighted, the right limb is not as free moving as the left shoulder and limb. The stride of the right front is shortened. As bend to the right is requested, the rider may feel more tension in the right rein. This is especially noted in the “green” untrained horse. During forward motion, the horse is freer in his less weighted left shoulder and limb. Therefore, this horse has an easier time picking up the left canter lead. *Does this, in and of itself make the horse a left-handed horse?* I do not think that is the correct assumption.

So, what happens to the feet when we have this shift in “center of gravity” that occurs and more weight is “shoved” into the right forelimb? Typically, the RF foot is more upright and takes a more forceful concussion during landing - as evidenced by a higher incidence of Suspensory and check ligament and shoulder injuries on the right front limb. It correlates with the shortened stride of a weighted shoulder. (I will expand on this aspect later.)

The left front, if not well trimmed, quite often has a long toe with a low and under-run heel. Without good farrier help these horses remain lower in the heel of that left foot. This limb is more subject to navicular, impar ligament, distal sesmoidean ligaments, deep digital flexor insertion on P-3, and upper forelimb tendon injuries than the more upright right forelimb.

The force of every stride that a horse makes in its lifetime passes through the Sacro-Iliac Joints. The right sacro-iliac joint, for most horses, is much more of an issue than the left one. The right S/I joint is, arguably, the most frequently manipulated/adjusted joint in the horse’s body. This is related to forces arising from the propulsive action of the LH “mobilizer” muscles. The vector created, runs diagonally across the body and as such is a shear force.

The paraspinal muscles are intensively innervated and are absolutely a key to refined athletic movement and performance. Primarily I am referring to the Multifidae group. For this palpation, I stand on the right side of the horse, and reach across the spine. With my fingertips, I apply traction horizontally toward myself by grasping the left side paraspinal muscles. The traction is applied to the *muscles* of the lower thorax and upper lumbar area. A significant flinch response indicates tension and pain in the *left* paraspinal muscles. Positioning myself on the left side of the horse and applying traction horizontally toward myself, does not, typically, elicit the same response.

Thus, again, the pain and hypertension is greater on the shortened myofascial tensioned side and thereby restricted side of the horse. It is possible that it may be a response to the shear forces that this area of the spine experiences. It is also very interesting to note that facet joints of the thoracic and lumbar vertebrae exhibit more pathology on the right side of the horse of the “right forelimb dominant” horse as compensation and deformation in accordance with Wolf’s Law of stress adaptation. (*Note, I do occasionally find a reverse in the Multifidae muscles reaction or they may be hypertensive on both sides of the spine). So much of this can depend on the quality of equitation, saddle slippage associated with improper fit or subclinical lameness).

Manifestations based on the grazing pattern:

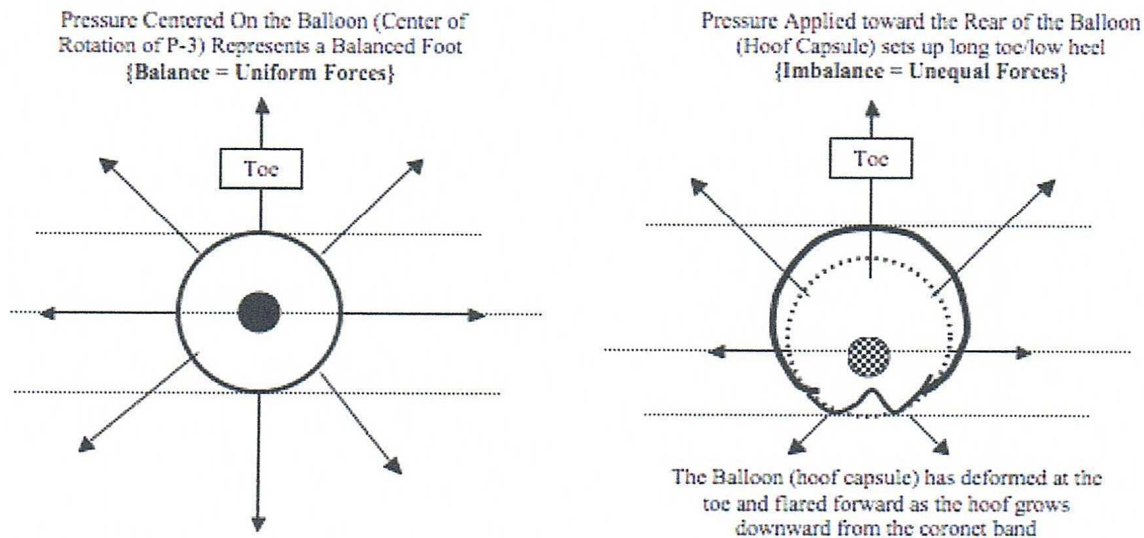
The position of the front feet during grazing gives rise to discussion and disagreement as to which foot is most weight bearing, i.e. providing primary support. When our typical dominant forelimb horse is in its grazing pattern, (i.e. left foot forward - in our example), most observers conclude that both the weight and the support are provided by the left front. However, observe, as the horse needs to move to another clump of forage - one that is still very close. It can move its “free” left front leg back or forward some distance without moving its right front foot. It will often stretch forward to the point where the right front is now behind the vertical - forming a triangle of support. However, overall, this grazing pattern indicates that the right front is the “dominant” *supporting* limb up to the point when, the horse needs to be able to move the right front forward.

While grazing, the right front cannot move forward until the horse shifts its weight onto the left front. It does so by leaning its body forward until the left limb becomes vertical and mechanically full weight supporting. The question then becomes, which limb spends the most time being the supporting/balancing limb? I would contend that it is the right fore foot.

Addressing the, typically, larger appearing left front foot, I question whether it is *amount of weight bearing or the direction (vector) of force during weight bearing that is responsible for the capsular distortion*. We all recognize the plasticity of the hoof capsule.

I often use a balloon filled with a viscous material as a metaphor for the hoof capsule. If one pushes down on the center of the balloon with a stick, the balloon spreads out with equally in all directions. If one then pushes down so the force is applied on the “heel” of the balloon to imitate the vector of force on the heel of the extended forelimb of the grazing horse, the “toe and quarter” flares out, while the “heel area” slides forward and

narrows. I am postulating that the foot has changed in shape by responding to the vectors of force as significantly as to the quantity of force - *pressure over time creates distortion.*



In support of this point of view, I quote Dr. Andrew Parks, MA, VetMB, MRCVS, Dipl. ACVS, professor of Large Animal Medicine at the University of Georgia's College of Veterinary Medicine. This quote is from his foot biomechanics presentation delivered at the AAEP Conference in December of 2012.

"A (Ground Reaction Force) force applied rapidly and immediately removed, such as the foot landing on the ground at speed, causes elastic change of foot shape that then immediately returns to its prior shape. In contrast, a prolonged and slow force applied to the foot deforms the tissue but when this force is removed, it takes much longer to return to its normal shape."

From my observations and the conclusions of Dr. Park's study, I strongly believe that we need to rethink whether the asymmetry (longer toe, wider foot, and perhaps, the under-run heel) has developed because of the vector of force on the "heel of the balloon," as a result of pressure over time while grazing versus the effect of the forces on foot shape when working at rapid gaits. After all, most horses spend far more time in a grazing posture than in work at speed.

Nomenclature Issues:

With regard to the manifestations, I have come to realize that we have a "nomenclature" problem. So the balance of this paper is my attempt to address this issue. There are bright, educated trainers, academicians, people in biomechanics and those quasi-academicians/clinicians (such as myself) who are defining laterality and dominance as being right forelimb dominant. Other very intelligent people in all these categories, and

for whom I have great respect, define the same horses “left handed,” or “left forelimb dominant.”

In debating the nomenclature associated with laterality, It is my strongly held opinion, that *the terms “right” or “left handed” are inappropriate and lead to confusion and give rise to strongly differing opinions by good people on both sides.* I am not trying to gore anyone’s ox. What is required is discussion and perhaps finding better terms and definitions. (I harbor no illusions that the terms right or left “handed” will disappear from the lexicon of the horse, especially within the context of the general public.) However, nomenclature is not insignificant. *We always need clarity of definition in order to adequately communicate with one another.*

That said, *this disagreement in the definition of “dominance,” weight bearing during given gaits,” and “balance” does not alter how we approach the straightening process.* That is to say that the training is based, not on our “definitions” or nomenclature, but rather on the observable biomechanics and “way of going” that we must change to achieve balance and straightness. But, because clarity of definition is important, I hope the readers of this paper have borne with me as I explained the reasons that I feel strongly that Mr. Schöneich, Pierre Beaupere, myself and a number of other persons focused on biomechanics are more correct in their term of *“right forelimb dominance.”*

These are the considerations that should be addressed: Are we attempting to define dominance by which limbs and which side of the body is more in control of movement or of support and balance? What role do muscles play in *Laterality*? What muscle actions create more ease of movement in one direction verses the other? When we use the term “dominance,” are we referring to use of muscles as more supporting, more balancing, or stronger in propulsion? Are the muscles, in a given limb facilitating - stabilizing or mobilizing.

I propose that the factors that I have observed relative to the preceding paragraph and have presented in this paper as manifestations of crookedness, give credence to viewing *supporting limb dominance* of 75 to 80 percent of horses being designated as being *“Right Forelimb Dominant”* rather than *“Left Forelimb Dominant.”* From academic discussion I think the terms of “handedness” should be avoided. Further study and consideration by all parties is in order. Existing studies, as valuable as they may be, in my opinion, do not adequately address laterality and the definitions of equine laterality per se, and may lead to the wrong conclusions.

I respectfully submit this paper to my colleagues for further discussion. It is still a work in progress.

Kerry J. Ridgway, DVM