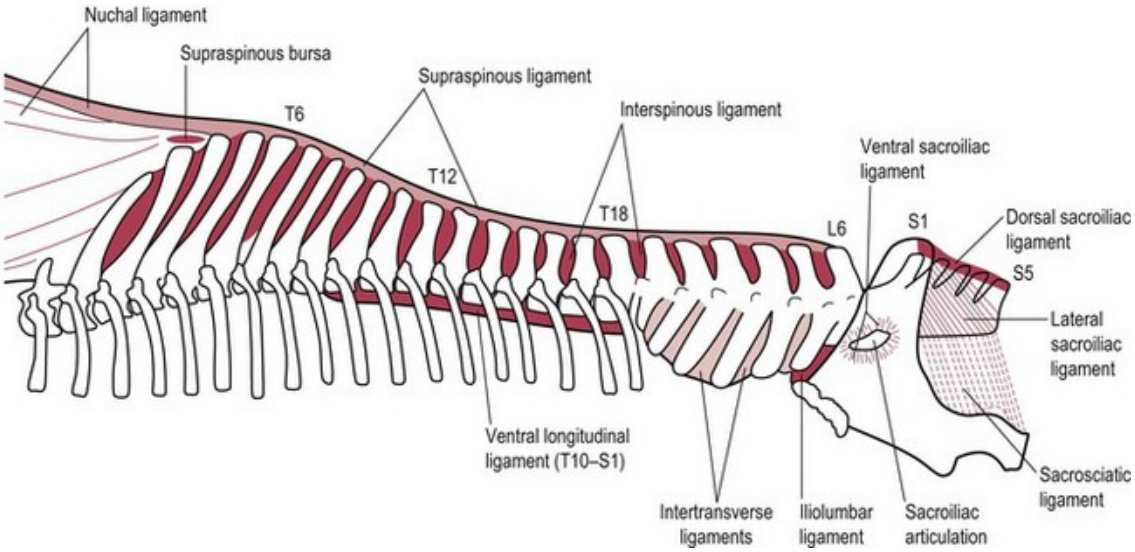
Equine Biomechanics and Training: Spinal Rotation

Prepared by Bre Marsh from the work of Jean Luc Cornille as presented on his web site:

Science of Motion

When training a horse it is important to realize that one is working with an intricate biomechanical system that must be understood in order to allow it to function properly.

One of the most widely unknown dynamics of the horse's functional anatomy is Transversal Rotation. This is the rotation of the spine that is created from lateral bending. This rotation primarily takes place between T14 and T9 and is recognized as either Proper Rotation or Inverted Rotation.



Proper Rotation (pictured left) refers to a bend that shifts the dorsal spines toward the inside of the bend while Inverted Rotation (pictured right) refers to a bend that shifts the dorsal spines toward the outside of the bend.

Proper Rotation results in a sound equine athlete, while Inverted Rotation can create a multitude of lamenesses. The most common symptoms are hock and stifle issues, however kissing spine, arthritic changes of the elbow, rib heads, sacrum and generalized behavioral issues are additional tell tale signs of a horse that is suffering from improper function of the spinal column.

As a rider, you can begin to notice the difference between Proper Rotation and Inverted Rotation by paying attention to how your weight is being shifted. Proper Rotation (left skeleton) will direct your weight to the inside of the bend, while Inverted Rotation (right skeleton) shifts you to the outside.

On the right is another illustration showing the same principle in Half Pass. Notice the rotation of the horse oriented towards the direction of movement, creating Proper Rotation (pictured left) vs. the horse tipping towards the outside of the bend, opposite the direction of movement, creating Inverted Rotation (pictured right). Notice the arrows depicting the direction of energy flow creating the bend. Proper Rotation is created by the forces generated in the hind quarter shifting the Center of Mass allowing the thoracic vertebrae to rotate properly under the seat of the rider. Inverted Rotation in this illustration, is a shoulder led movement that is generated from a driving seat of the rider creating a downward force of energy, loading the forehand unnecessarily.

A rider equipped with the understanding of biomechanics and a stable pelvis, is key to the longevity and general wellness of their equine partner. "In order for one to develop a stable pelvis, the rider must have neutral balance of their head, shoulders, back, pelvis and upper thighs, all aligned and facing in the exact same direction. The driving seat for instance places the rider further back on the gluts. Here, the body weight is acting back to front, hampering the rider capacity of bending the horse's thoracic vertebrae." This theory presented confronted by modern science debunks previous

understanding of bending the horse around the inside leg. Though perhaps a common mental picture, biomechanically it is impossible to create a Proper Rotation of the spine with the inside hip and thigh because the thigh pushes against the thoracic vertebrae column effectively causing the dorsal spines to shift to the outside of the bend, or Inverted Rotation.

Instead of the driving seat, one must create a soft seat that follows the horse's movements and remains neutral, only offering select, precise aids that create two-way communication through the seat rather than attempting to create a movement with direction and force. Once the rider has begun to develop a neutral seat, the shifts from Proper to Inverted Rotation become obvious and proper biomechanic function may be developed.

Below is a series of images depicting proper alignment of the head, shoulders, back, pelvis and thighs through a left and right turn. Variations in degree of rotation will result in shoulder in or half pass. Notice the steadiness, this is a soft seat, not a doughy seat! Also understand that these positions have been exaggerated for ease of understanding in the absence of the horse. It is highly recommended to add these movements to your daily routine, observing oneself in the mirror, being sure to maintain parallel hips and shoulders. If the hips rise, the thigh will be pressing against the dorsal spines, causing inverted rotation!

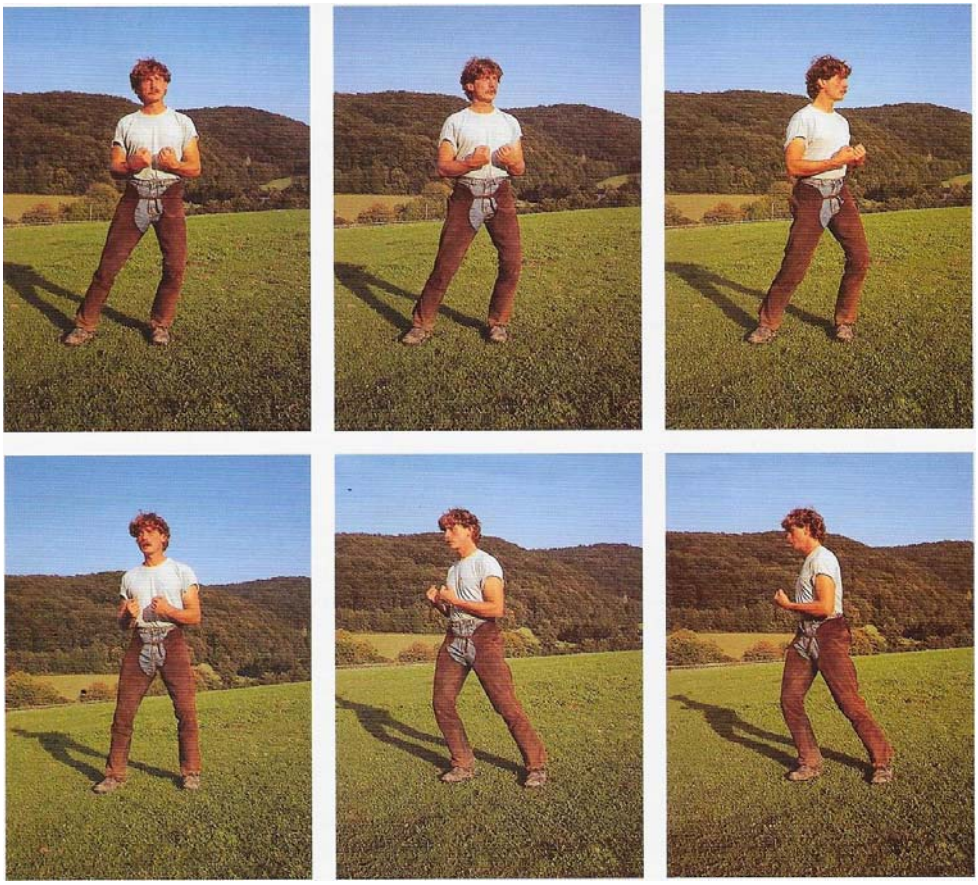


Image sourced from Klaus Ferdinand Hempfling in his *Dancing with Horses*.