

Your Horse's Basic Anatomy (and Biomechanics) SIMPLIFIED by Jim Masterson

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Jim Masterson

A basic understanding of your horse's biomechanics helps to improve the quality of performance by giving the rider a mental reference for what he/she is asking the horse to do. Of course, to understand basic biomechanics, we need to learn a little basic anatomy.

"Anatomy! I don't have time to try to memorize a bunch of long, unintelligible (that's a long one), Latin combobulations!"

Equine anatomy doesn't need to be intimidating. We're going to try here to break it down into intelligible pieces, same as training a horse. So calm down, keep on reading, and focus on the pretty pictures.

We're going to start this month by taking a look at the skeleton, and we're going to put it into the context of some of the movements that you ask of your horse, so that it might have a chance of sticking. Next month we'll talk about some of the muscles that support and move the skeleton.

The Three Key Junction That Most Affect Performance

There are three key junctions in this skeleton that we're going to look at, that most affect performance in the horse:

- 1) The Poll/atlas Junction
- 2) The Neck/Shoulder/Withers Junction
- 3) The Hind End – Sacro Lumbar Junction and Sacroiliac Joint

And just to keep you on your toes we're going to throw in...The Back.

These key areas, if kept moving, healthy and supple will keep your horse working in optimal strength and balance.

Your Horse's Skeleton

Now let's look at these key junctions from the point of view of your horse's skeleton, or bones. This is the structure that the muscles act on to move your horse.

1) Your Horse's Poll/Atlas Junction: Starting at the head we have the poll. Next we have the first Cervical Vertebra, the Atlas or C1. Maintaining flexibility in the poll/atlas junction is key to maintaining balance, suppleness and strength in the entire horse. Here the central nervous system passes from the horse's brain to his entire body. Any tension here creates tension and restriction in range of motion (ROM) in the rest of the body. Conversely, tension that accumulates elsewhere in the body affects the poll.



2) Your Horse's Neck/Shoulder/Withers Junction: The horse's neck is composed of seven Cervical Vertebrae; C1 through C7. (Note that the Cervical Vertebrae run low in the neck and not along the topline as many believe.) C1 is attached to the head. C7 attaches to the body at the first thoracic vertebra, or T1. This is what we call the C7-T1 Junction.

On the right and left sides of this junction the horse's forelimb attaches to the body via the shoulder blade or Scapula. Although the front leg attaches to the Scapula at a Shoulder Joint, the Scapula

itself is not attached to the body by a joint, but with muscle and cartilage only. That means the entire foreleg is essentially attached to the body through muscle and connective tissue. This is important as it allows an extended range of forward, backward and lateral movement of the forelegs, suspension of the body and the ability of the horse to lift in his withers when using the hind end. But more on that next month...

Note: As you can see from the photo, what you feel as the withers of the horse are actually the tips of long dorsal spinous processes of the fourth through the eighth thoracic vertebrae (T4 through T8) that project up between the shoulder blades, or scapulae of the horse. These processes can be as long as 10 inches.

Each thoracic vertebra has ribs attached that form the trunk of the horse. There are 18 Thoracic Vertebrae.

Your Horse's Back

We're going to throw the Back in here because, not only is it important as it gives the rider something to sit on, but it connects the front to the hind. In fact, the back can be thought of as a channel of power, connection and communication from the hind through to the front of the horse. If the back isn't supple and working right, then the entire body loses bend, gymnastic ability and balance.

The Back is comprised of the Thoracic Vertebrae from behind the withers to the last Thoracic Vertebra (from around T8 to T18), and the Lumbar Vertebrae. There are six Lumbar Vertebrae. The Thoracic part of the back provides support for the rider. The lumbar vertebrae have no ribs, but have a large area for the attachment of powerful hind end muscles that drive the horse forward. (More on that later.)

3) Your Horse's Hind End Junction – Sacro Lumbar Junction and Sacroiliac Joint: The last Lumbar Vertebra (L6) attaches to the hindquarters at a very important junction called the Sacro-Lumbar Junction.

The Sacro-Lumbar Junction can be imagined as a huge hinge joint that flexes forward and under and extends out and behind, enabling the jumper to jump, the thoroughbred to gallop, the cutting horse to work off the hind, or the dressage horse to piaffe. Without freedom in this critical junction, then the collection that this reaching under gives would not be possible.

Just behind this is the junction between the Sacrum and the Pelvis. This is the Sacroiliac Joint, or rather joints, as there is one on each side of the Sacrum. This is a large joint connected with large ligaments and large muscles, and can be imagined as the main junction through which the power generated by the hind limbs transfers into the body. Although it can be injured through accidents such as slipping or falling, often it is cumulative stress through overwork or over-work that creates problems here.

As opposed to the fore limbs which are attached to the body by muscle, the hind legs are attached to the body via the Hip Joint at the pelvis. The Hip Joint is a ball-and-socket joint akin to the Hip Joint in the human. From there, as in the human the thigh bone, or femur goes down to the stifle, which in a human is called the knee. From there, the tibia goes down to the hock, which in us is an ankle and heel, and from there down to the horse's foot.

Next issue we're going to look at some muscles. Muscles produce movement by flexing and straightening a joint between two parts of the skeleton.

Jim Masterson was the equine massage-bodywork therapist for the 2006, 2008, 2010, 2012 and 2014 US Endurance Teams, and has worked on horses competing in the FEI World Cup, and Pan American and World Equestrian Games. He is the author of the book and DVD Beyond Horse Massage (mastersonmethod.com).

Coralie Hughes is a Masterson Method® advanced course instructor and certified practitioner, as well as a USDF bronze medalist and "L" Education Program graduate with distinction. She is the co-author with Jim Masterson of the DVD Dressage Movements Revealed and the book Dressage Horse Optimized (mastersonmethod.com).

Do you have equine bodywork questions? Jim is now offering the opportunity to ask questions on a free live webinar each month entitled: "Talk with Jim". Go to the www.MastersonMethod.com website and click on "Talk with Jim" on the menu bar to the left for information on how to participate. Jim Masterson has been the equine bodywork therapist for the 2006, 2008, 2010, 2012 and 2014 USEF Endurance Teams, and has worked on thousands of performance horses, including competitors in FEI World Cup, Nations Cup, Pan American Cup and the World Equestrian Games. He is the author of the book and DVD Beyond Horse Massage, and DVD Dressage Movements Revealed. He teaches the Masterson Method® of Integrated Equine Performance Bodywork to horse owners and therapists around the world