

MUSCLE ATROPHY

and the Saddle Fit Connection

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Muscle atrophy is usually something we see happening in old people—and old horses. Muscles waste away from simple aging and lack of use. Sadly, rescue horses who have suffered starvation usually show signs of muscle atrophy, regardless of their age. In short, muscle atrophy is a decrease in muscle strength because of a decrease in muscle mass or the amount of muscle fibers. Atrophy can be partial or complete, causing varying levels of weakness.

When atrophy occurs in the aging process, it's referred to as *sarcopenia*. Sarcopenia is defined as an age-related loss of skeletal muscle, resulting in frailty. It is often partnered with osteoporosis, a loss of bone density that is similarly associated with aging. But age isn't the only cause.

If your horse is laid up due to injury and his regular exercise comes to a grinding halt, you can expect his muscles to atrophy to a degree. But what if your horse isn't old, hasn't been on stall rest and you are exercising him diligently on a regular basis, yet you notice his muscles diminishing? Unfortunately, muscle atrophy does sometimes happen, despite your best intentions and efforts.

The primary concerns for a horse owner are whether the muscle will regenerate, returning to its normal size and shape, and how to treat the horse to help it recover. Physiotherapy often helps, but it's important to first consider the possible causes.

Let's assume you haven't really changed anything in his daily routines, including his diet. There are many diagnostic tools available to determine the cause of muscle atrophy, including examining the muscle enzymes, measuring serum samples to determine Vitamin E concentrations, ultrasonography, radiography, nuclear scintigraphy,



Courtesy of Karen Losbaugh, CSE.

A horse reacting defensively while being saddled presumably in anticipation of pain he has previously felt by an ill-fitting saddle.

electromyography (EMG) and even muscle biopsy.

Before all that, however, it is useful to consider something simple but all-important.

Consider the Saddle

Muscle atrophy in horses is often caused by an ill-fitting saddle. If an unbalanced saddle puts too much pressure on a particular muscle and the horse tries to remove or avoid this pressure, he goes into 'defensive mode' by contracting the muscle (and the surrounding ones) and may even alter his gaits. Under the point of pressure, where circulation is impacted (thus reducing nutrients and oxygen to the affected area), the muscle will 'undevelop' or atrophy.

Atrophy will occur under severe instances of constant pressure. The pressure will first damage the hair follicles (resulting in hair loss and/or white hair). The atrophy can be reversed only when the cause is addressed (i.e., the pinching saddle), allowing the muscle to regrow—although the white hairs will remain. Muscle memory will help in the rebuilding of atrophied muscles if they were properly trained in the first place; it will take significantly longer to build up untrained muscles or incorrectly trained muscles that never developed properly in the past.

Understanding Atrophy

Muscle atrophy—or muscle wasting—is a medical term defined in its most simple terms as a decrease in muscle mass. There are generally two forms of muscle atrophy; disuse atrophy and neurogenic atrophy. Both present themselves in a similar fashion but have significant differences in their cause. The former is a loss of muscle due to lack of physical activity while the latter is due to a problem with the nerves that connect to the muscle itself.

Muscle definition can actually be a form of atrophy—but it is negative definition in this sense. Positive definition is development of muscular conformation as expected during proper training; negative definition happens when defensive contraction occurs to counteract a poorly fitting saddle. This negative muscle definition is considered 'hypertonic,' which means the contraction phase of the muscle(s) is unnaturally long and in a state of abnormal tension. This results in tight, cramped and painful muscle development—which can look like atrophy.

Disuse muscular atrophy is the most common type of muscle wasting. Neurogenic muscular atrophy, often the result of injury to or disease of the nerves that connect to the muscle, is much less common but far more difficult to treat.

Neurogenic muscular atrophy can develop when interruptions occur in peripheral motor nerve function. Usually not all the motor fibers supplied by the nerve undergo atrophy; some remain relatively normal. A severe prolonged neuromuscular blockade can induce neurogenic muscle atrophy. Although atrophic cells may have diminished function, they are not dead initially. However, atrophy may progress to the point at which cells are injured and die.

Ischemia is the medical term for an inadequate blood supply to an organ or part of the body and occurs due to the reduction of blood flow to the capillaries because of pressure—as is often the case with a pinching saddle that is too small in the gullet channel, or too tight over the withers and shoulder because of a tree that has an incorrect angle and width. In ischemic tissues, if the blood supply is inadequate even to maintain the life of shrunken cells, cell injury and cell death may result.

Muscle atrophy in the shoulder area of the horse even has a common name "Sweeney shoulder." It is caused by damage to the suprascapular nerve that controls the supraspinatus, infraspinatus and triceps muscles. This condition may also be caused by a sudden movement or weight change from the front end of the horse to the hind end of the horse, such as in polo or jumping events.

Over 100 years ago, when horses were the primary source of transportation, Sweeney shoulder was caused by the heavy harnesses horses had to wear while pulling carts and buggies. These harnesses would pinch



Somewhere in this horse's past an ill-fitting saddle caused damage noted by the white hairs.



Example of muscle atrophy behind the saddle.



The trapezius muscle can be inflamed from an incorrectly angled tree point/gullet, resulting in this bulge and nearby hollow behind the withers.



An incorrectly fitted gullet plate puts constant pressure on the side of the withers, resulting in the formation of this stress line due to the 'defensive' contraction of the trapezius muscle.

“It takes four times longer to develop a muscle than it does to lose muscle...”

or bruise this nerve against the shoulder blade, causing prolonged and continuous muscle damage.

This compression of nerves is also seen in other places on the body, leading to muscle atrophy wherever it occurs.

When a muscle has been developed through training more than it would have naturally, and then not used for a while, it will naturally ‘atrophy’ back to its shape as nature would have determined it. It takes four times longer to develop a muscle than it does to lose muscle, which is why a person’s illness resulting in bed rest can have such a drastic effect on his/her leg muscles when he/she starts to move around again. The effect on a horse on stall rest can be similarly dramatic.

Warning Signs: Check Your Saddle!

The physical signs of saddle fit trauma and the atrophy that follows are easier to spot than the psychological signs. Warnings that your horse is in pain include head tossing, bucking, stumbling, tongue issues, rearing and resistance. White hair, dry spots and muscle atrophy are visual effects of poor saddle fit.

Each of these manifestations has originated in a saddle that has not been fitted properly to the horse—either the gullet channel is too narrow, the tree points and gullet plate are not roomy enough at the withers, or the angle of the tree at the gullet does not match the shoulder angle, allowing it to pass through clearly (like a sliding door). The spinal issues, nerve damage and cartilage injuries that are the result of poorly fitting saddles may take months or even years to appear. One sign is a horse that is ‘girthy,’ anticipating pain once he’s girthed up.

Those of us who fit saddles have seen terrible muscle atrophy in the trapezius created by pressure from a pinching saddle, but there is one major potential mistake in what is being written about atrophy. If your horse seems to be narrowing behind the shoulder area, it is not necessarily due to muscle atrophy but rather because the muscle lengthens during use. A good analogy is when the hand goes up to the shoulder, the biceps becomes big (contracting, shortening, wider). But then when you stretch out your arm (i.e. lengthen or stretch the muscle) you’ll see how narrow your muscle appears—just like a horse’s back which is stretched. As your horse becomes more supple, the longissimus dorsi muscle should lengthen. Unfortunately, this is sometimes mistaken for muscle atrophy.

Just like in bodybuilding, understanding muscle definition and biomechanics will explain why certain parts of the body become bulky, while others become more defined and appear slimmer. After working out for a year, a bodybuilder probably needs a new jacket because his

upper body has gotten bigger, and new pants because his waist has gotten smaller—and not because of atrophy due to pressure from his belt!

Do the Right Thing

Horses do not consciously behave badly and really want nothing more than to please their leader. Horses value this bond between themselves and their riders. When the saddle causes pain, it creates confusion for the horse and frustration for the rider.

As a rider, you intuitively know when something is wrong in your relationship, even before you see the physical signs of saddle (or any other) pain; you see it in your horse’s eyes, you feel it when he doesn’t nicker or come to you freely when called. When the horse expresses himself this extremely, he has already suffered for many days. Now he is anticipating pain.

Make sure that you aren’t exacerbating the problem because of what you perceive to be the problem. It’s important to address the root cause as soon as possible. Your saddle may need to be adjusted. In fact, it should be checked regularly. If that doesn’t solve the problem, consider other possibilities. Some forms of atrophy are actually caused genetically, such as PSSM (polysaccharide storage myopathy). Muscle atrophy is a common clinical sign of this, which is most common in Quarter Horses, Belgians, Percherons and Warmbloods.

Always contact your equine professionals to help you determine what’s going on whenever your horse seems resistant or in pain. Your partner deserves nothing less. 🐾

Muscle Conditions Compared

Another question that sometimes comes up is ‘what is the difference between muscle atrophy and muscular dystrophy?’ While atrophy and dystrophy are both terms related to muscular functioning, muscular atrophy is the wasting of muscles due to loss of tissue (because of inactivity or due to the above influences) while muscular dystrophy is a group of muscle diseases that lead to reduced mobility because of neurological weakness in the muscles.

Muscular dystrophy can be seen to be more severe than muscle atrophy since dystrophy is hereditary and has no cure. Loss of muscle tone due to muscle atrophy can usually be regained, although this depends on the underlying cause.

Muscle hypertrophy is an increase in the size of a muscle through an increase in the size of its component cells. It differs yet again from muscle hyperplasia, which is the formation of new muscle cells.