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Tying-Up in Horses

Tying-up, aka exertional rhabdomyolysis, is a common equine muscle disease often caused by PSSM

Overview

The term tying-up is commonly used to describe horses that are stiff, sweaty, and reluctant to move due to pain originating from the large muscle groups in the back, pelvis, and hind limbs. In rare cases, the muscle in the forelimbs and shoulders can be affected.

Mild cases of tying-up can be challenging to diagnose because the horse might only seem stiff, "off," or lame. Horses with a moderate or severe tying-up episode show not only the classic signs described above, but can also have elevated heart and respiratory rates and appear anxious or colicky. Very infrequently, in severely affected horses, massive muscle damage can occur, which leads to kidney failure and death.

Tying-up is also called exertional rhabdomyolysis (rhabdomyolysis means destruction of skeletal muscle cells), azoturia, set fast, Monday morning disease, or paralytic myoglobinuria. The last name originates from dark red urine produced due to a red protein called myoglobin that is released from damaged muscle cells and excreted in urine.

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Tying-up is commonly used to describe horses that are stiff, sweaty, and reluctant to move due to muscle pain.

Causes of Tying-Up

Horses can tie up either unexpectedly/sporadically, or it can be a chronic, ongoing, and frustrating problem. Potential reasons for sporadically tying-up include exercising beyond the current level of conditioning; sudden changes in training regimens; exercising in hot, humid conditions; a recent history of a viral respiratory tract infection; gender (high-strung/nervous fillies and mares appear to tie up more frequently than males); and dietary issues.

For example, horses fed high-grain diets or those lacking selenium/vitamin E, electrolytes, and/or minerals might tie up more frequently than horses with balanced diets.

Tying-up in some Thoroughbred racehorses is thought to be caused by abnormal regulation of muscle contraction. Specifically, affected horses appear to have a defect in how the calcium is pumped back and forth into storage sites within muscle cells, which can lead to muscle cramping and damage. In these horses, stress, excitement, lameness, high-grain diets, and certain levels of exercise are thought to be potential factors that trigger this aberrant calcium regulation.

In cases of recurrent or chronic tying-up, one of the most well-studied and common causes is polysaccharide storage myopathy (PSSM). This is a condition typically diagnosed in Quarter Horse and draft-related breeds characterized by the abnormal accumulation of glycogen (a polysaccharide) in skeletal muscles. Researchers have identified one cause of PSSM—a genetic mutation in the gene called glycogen synthase 1 (GYS1) that results in the overproduction of glycogen in muscle tissues. This mutation has been identified in 17 different breeds, including draft horses and Quarter Horse-related breeds. However, other causes of PSSM are suspected and are currently being studied.

Diagnosis

A diagnosis of tying-up can usually be made based on a physical examination and blood work, including measurement of muscle-specific enzymes in serum. Creatine kinase (CK) levels can reach extremely high levels beginning within hours of the horse tying-up, whereas other enzymes—such as lactate dehydrogenase (LDH) and aspartate amino transferase (AST)—are longer-term indicators of tying-up. These enzyme levels peak approximately 12 and 24 hours, respectively, after the damage has occurred. CK levels return to normal within three to seven days; other enzyme levels can take up to 14 days to normalize. Monitoring enzyme levels can help establish a diagnosis and be used to guide the owner, trainer, and veterinarian in determining when it is appropriate to resume exercise.

While establishing that a horse has in fact tied up is relatively straightforward, determining the underlying cause of the tying-up episode can be more challenging and generally necessitates either seeing how the horse responds to changes in diet and exercise or additional diagnostic tests, such as muscle biopsy.

Like any disease, it is always important to distinguish a suspected tying-up episode from other, more serious musculoskeletal conditions such as a fracture, laminitis, or conditions such as neurological diseases. Signs associated with the accidental ingestion of poisonous plants or other toxins can also be mistaken for tying-up.

Treatment

If you suspect your horse is tying-up, stop exercising the horse immediately and place him/her in a stall and call your veterinarian. Affected horses should not be moved, walked, or exercised. While waiting on your vet, place a blanket on your horse

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if the weather is cool and offer small, frequent amounts of water. You also might offer a salt block or a bucket of water with electrolytes added to it. Offer hay only until directed otherwise by your veterinarian.

Since there are multiple causes of tying-up, there is no one single treatment plan. Your veterinarian will treat the horse depending on the severity and underlying cause (if known), possibly giving a sedative such as Acepromazine and an anti-inflammatory such as phenylbutazone to help control pain and to relieve anxiety. Some veterinarians might administer intravenous fluids, dimethylsulfoxide (DMSO), and/or dantrolene, depending on the case.

Recovery

Most horses recover within a few days of tying-up, but severe cases can take 10 days or more. Once the horse begins to move pain-free, he can have small paddock turnout. Once enzyme levels are at or near normal limits, activity can be slowly re-introduced. Some horses with chronic tying-up (PSSM particularly) are kept active even when their muscle enzyme levels are above normal as total rest seems to exacerbate signs of muscle stiffness.

Prevention

Your veterinarian will recommend specific preventive strategies based on the cause of your horse's tying-up, but there are some general ways to help prevent episodes. For example, maintain a regular exercise regime and increase training gradually, not abruptly. In young, high-strung fillies, establish a daily routine, minimize stress, and modify her diet to include a balanced vitamin and mineral supplement, feed high-quality hay with minimal grain and sweet feed, and increase the amount of fat fed (in the form of vegetable oil, for example). These dietary changes can be appropriate for other horses suffering from chronic or recurrent tying-up.

Acepromazine can be used daily at low doses in stressed or nervous horses that tie up frequently, and dantrolene can be fed to fasted horses one hour prior to exercise to potentially prevent an episode. Daily oral administration of phenytoin has been advocated, but can cause drowsiness depending on the dose. Each of these options requires a prescription from your veterinarian.

FAST FACTS

- ***Tying-up*** is also known as exertional rhabdomyolysis, azoturia, set fast, Monday morning disease, or paralytic myoglobinuria.
- ***Affected horses*** are stiff, sweaty, reluctant to move, and often appear anxious.
- ***Tying-up can be caused by a number of underlying*** conditions, including electrolyte, vitamin, and mineral imbalances; changes in exercise; abnormal muscle contraction; or genetic mutations causing an accumulation of glycogen in muscles (i.e., PSSM). In many cases, the cause of tying-up is never established.
- ***Diagnosis*** is based on clinical signs and markedly elevated muscle enzyme levels. Additional diagnostic tests might be recommended by a veterinarian.
- ***Preventative*** measures can be instituted to minimize recurrence of tying-up. These include dietary, training, and management strategies and possibly the use of pharmaceutical drugs (under the advisement of a veterinarian).