

From the Morphettville Equine Clinic

TYING-UP

Tying-up is a condition that has a big impact on the Australian racing industry, with 5.4% of horses tying-up during a racing season. The condition therefore has a significant economic impact on the horse industry and hence it is essential that trainers have a good understanding of how to treat and manage this condition. Tying-up, also known as Exertional Rhabdomyolysis (ER), refers to the break down of muscle fibres during a period of exercise. Horses suffering from a bout of tying-up can show a range of signs including a stiff gait, reluctance to move, profuse sweating and an increased heart and respiratory rate. They can often have firm, painful, hot and swollen muscles particularly over the lower back and hindquarters, but sometimes the triceps region is also involved. In more severe cases the horse may have dark red-brown coloured urine due to the presence of muscle pigment myoglobin which has leaked from damaged muscle cells and been filtered by the kidneys into urine.

Tying-up is not a single disease, but a collection of clinical signs that may have different causes in each horse. This is evident in the fact that treatment and prevention protocols that seem to work on some horses do not help other horses. Only recently have researchers began to classify and study the specific disease conditions that result in the clinical syndrome of tying-up. Horses that tie-up only once or a few times in their life are classified as 'sporadic' whereas horses that tie-up on a regular basis are termed 'chronic'.

SPORADIC TYING-UP

Sporadic tying-up is seen in horses that usually exercise normally but suddenly develop signs of this muscle disease. It is usually associated with a particular training or feeding change or mistake. The most frequent causes of sporadic cases of tying-up are: exercise that exceeds a horse's underlying level of fitness, exhaustive exercise, electrolyte and mineral deficiencies, hyperthermia and strenuous exercise whilst suffering from a respiratory infection.

CHRONIC TYING-UP

Some horses suffer from a chronic form of tying up, where the condition begins at a very young age, with continued bouts, even when only lightly exercised. This syndrome has been described in many different breeds and may have many different causes. Recently two specific causes of chronic ER have been identified; Polysaccharide Storage Myopathy (PSSM) which occurs in quarter horse related breeds and Recurrent Exertional Rhabdomyolysis (RER) which occurs in Thoroughbreds, Standardbreds and Arabians.

Recurrent Exertional Rhabdomyolysis

RER is the form of tying-up which probably has the biggest impact on the thoroughbred racing industry. RER is most common in young, nervous fillies and mares. These horses often develop the condition when they are excited, stressed and/or after a period of stall rest. Commonly RER occurs when exercise and excitement combine, especially when horses are held back at a pace slower than they desire. However RER can develop in colts and geldings and 'calm' horses. Genetic research and breeding trials indicate that this condition is an inherited trait in thoroughbred horses.

The precise cause of RER in horses has been the subject of scientific research for several years. Recently it has been shown that muscle lactate concentrations are not elevated in these horses when tying up occurs and that the condition usually occurs during aerobic (slow) work. Hence it has been concluded that contrary to earlier beliefs, muscle lactic acidosis is not associated with RER. As a result tying-up is not responsive to bicarbonate therapy. Instead current research indicates that this form of tying up is the result of an abnormality in the way muscle cell contraction is regulated by intracellular calcium levels.

DIAGNOSIS

A diagnosis of exertional rhabdomyolysis is usually made based on a history or current clinical signs of muscle pain and stiffness after exercise. A blood sample should be taken to measure levels of the muscle enzymes CK and AST. Elevations in these enzymes indicate the degree of muscle cell damage that has occurred. After an episode of tying-up CK levels peak at 4-6 hours following the event and then start to decline rapidly, returning to baseline within 24-48 hours. AST levels peaks at 24 hours after an episode and can be elevated for several days.

Sometimes thoroughbreds with RER suffer from mild or subclinical episodes of tying-up, which can still have a detrimental effect on their performance. In such cases it can be helpful to perform an exercise test for subclinical tying-up, which involves trotting the horse at a steady speed for exactly 15 minutes and then taking a blood sample at 5 hours after the test. A 3-4 fold increase in the levels of CK enzyme levels will confirm subclinical tying-up.

ACUTE TREATMENT

No matter what the cause, an acute episode of tying-up usually requires some initial treatment measures and your veterinarian should be consulted.

- REST - The horse should be rested in a box which limits stress and excitement, allowing the horse to be more comfortable and to limit further muscle damage. Rest is only required until the initial muscle stiffness abates (usually <24 hours) after which hand walking should be initiated.
- TRANQUILISERS - Acepromazine can help by reducing anxiety, but also by increasing circulation to the affected muscles.
- ANTI-INFLAMMATORIES – Phenylbutazone, flunixin or dexamethasone should be administered to control inflammation in the muscle and provide pain relief.
- REHYDRATION - Horses that tie-up are dehydrated and have lost significant amounts of electrolytes through sweat. Mild to moderated cases will benefit from drenching with electrolyte solutions (salt washing) and electrolyte supplementation in feed. The administration of intravenous fluids should be given in severe cases, especially where myoglobinuria is present.

MANAGEMENT/ PREVENTION

Prevention of future episodes of tying-up occurring is multifactorial and depends on what the cause of the previous episode was. In the case of an episode of sporadic tying-up prevention of further episodes is usually the result of common sense and addressing and

corrected the particularly training or feeding change/mistake. Critical elements include:

- Do not overexert unfit horses
- Ensuring diets are sufficiently supplemented with electrolytes prior to times of heavy sweat losses.
- Do not overwork horses with lameness or upper respiratory tract problems since they are at an increased risk of tying up
- Matching the amount of grain to the energy needs for their current level of work.

For horses suffering from RER prevention of further episodes is more difficult and several measures will need to be implemented to manage this condition. Preventative measures should be considered under the following three categories.

TRAINING PROGRAM

- Controlling the environment of these horses to reduce anxiety and nervousness is essential.
- Limit stressors and have a well established daily routine.
- House in a quiet location next to compatible horses
- Administration of 2-1 25mg acepromazine tablet 30 minutes prior to work often helps prevent tying up, especially in nervous fillies.
- Regular daily exercise with no days off. Introduce training changes gradually.
- Avoid holding these horses back at a pace slower than they desire.
- Swimming horses before pace work can prevent tying-up.
- Avoid warming down at the trot – go from pace work straight to a 10-15 minute walk.
- Thoroughbreds with RER seem to cope better with more fast work and less slow work.
- Prolonged periods of box rest can predispose to episodes of ER. These horses benefit from
- Walking them in the afternoon for 15-20 minutes
- Daily turning out onto pasture or large paddock if possible.

ELECTROLYTES/SUPPLEMENTS

There are numerous supplements, salt mixes and injectable products currently recommended to prevent tying up. Some of these can be beneficial, but careful dietary management and alterations in the training program are the most critical aspect of preventing RER.

- Vitamin E / selenium – Research has shown that deficiencies in these substances are usually not an underlying cause of tying-up. However being potent anti-oxidants, they do provide protection to damaged muscle tissue and may help to reduce the symptoms of tying up and speed recovery. Many good quality oral supplements are available.
- Injectable formulations - Kynoselen®, Tripart® and Mitochondrial® are products reported to help in the treatment and prevention of tying up. They contain selenium and essential minerals, amino acids and vitamins that may aid in muscle function and recovery.

Kynoselen also contains the ingredient heptaminol, a vasodilator that may improve blood flow to the muscles and help treat and prevent tying-up.

- Electrolytes - Correct electrolyte status is essential for nerve function and consequently muscle contraction. Research has shown that some horses with recurrent episodes of tying-up will have reduced severity and occurrence of tying-up once electrolyte balance is controlled with proper dietary supplementation.
- A complete and balanced commercial electrolytes preparation should be added daily to the feed ration.
- Administer an electrolyte solution either by nasogastric tube or syringe when increased losses are expected i.e. pre-race/before travelling.

Twydil market a supplement in sachet form called 'Protect Plus' for use in horses prone to tying up. It contains vitamin E/ selenium and essential vitamins and minerals for muscle function and repair. One study demonstrated that horses supplemented with 1 sachet per day of Twydil Protect Plus® for 10 days benefited by significantly lower CK levels when compared to a non-supplemented group of horses.

FEEDING REGIME

Diets composed largely of soluble carbohydrates such as cereal grains and molasses can increase the occurrence and severity of tying-up. Substituting a proportion of dietary calories derived from soluble carbohydrates with additional fat has been proven to reduce the severity of episodes of ER.

- 20-25% of the calories that are supplied should come from fat
- Increased fat in the diet can be easily achieved by adding vegetable oil (1-2 cups per day) or rice bran.
- Rice bran (EQUI-JEWEL®) which is 15-20% fat is a more palatable source of fat. EQUI-JEWEL® is also supplemented with high levels of vitamin E and selenium.
- There are several commercially prepared high fat, low starch feeds available (ie HYGAIN Release®, KER Releve®) which are supplemented with vitamin E, selenium and increased electrolytes to help prevent tying up.
- High levels of fibre should be supplied in the horse's diet, with at least 5kg of grass hay to be fed daily.
- Avoid feeding oats all together in RER horses that continually tie up. Oats appear to create a greater risk of tying up than other grains, and should be replaced by barley, lupins, sunflower seeds and oil or rice bran to provide energy for work.

It is important to understand that each horse is different, and that each recommendation made above may work for some horses with RER and not others. Try and learn what factors trigger an episode in your horse and work to minimise those. It is often a matter of trying several different approaches until you find a program that works best for your individual horse. Regular monitoring of CK/AST levels is essential for subjective assessment and for identification of subclinical or mild episodes.

– Dr. Annemarie Cullimore, MVB
Morphettville Equine Clinic