Explanation about
Laminitis in sport horses

Not only overweight ponies can succumb to laminitis. Laminitis also occurs in sport horses. What is the cause and how can we prevent our horses from contracting this very painful and sometimes even fatal condition?

The mechanisms of the hoof
Laminitis (or founder) is an inflammation of the dermis. In the hoof, the connection between the coffin bone and the hoof wall is formed by this dermis. Laminae are formed from both sides, which interlock and thereby ensure that the coffin bone is firmly fixed in the hoof shoe. When they become inflamed, the connection between bone and hoof wall can be damaged and weakened. In addition, the dermis contains an extensive system of blood vessels, which is essential for nourishing the dermis and maintaining the connection. The blood supply comes from the heart, through the large blood vessels, to the leg and is then transported through an extensive system of blood vessels to the heel bulbs. From there, the blood passes through tiny vessels under the sole and then up under the wall of the hoof. When something goes wrong with this blood supply, the dermis dies. If the connection between the coffin bone and hoof wall is lost, the coffin bone can rotate and/or sink inside the hoof shoe and eventually the bone can even puncture the sole with severe (fatal) consequences.

Causes of laminitis
Much of the mechanism of exactly how the laminae become inflamed is still unknown. We do know that there is often an underlying cause in the body. In the case of the pony, this can be caused by absorbing a large amount of sugar (for example, fructanes from the grass, too much grain or sugars in muesli). As a result, there is a shift in the composition of the bacterial flora in the colon and cecum. As a result, more lactate (lactic acid) will be produced and the insulin in the blood will rise. This is more likely to occur during rigorous changes in diet. Therefore it is wise to introduce feed changes gradually and to adjust the amount of feed to the horse's workload.

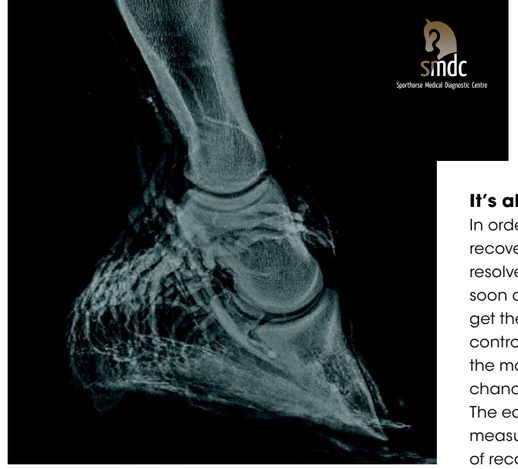
PPID
The insulin level in the blood can also be disrupted by certain metabolic diseases. PPID (Pituitary Pars Intermedia Dysfunction) involves damage (degeneration) of a part of the brain (the hypothalamus). This leads to a reduced production of dopamine. This removes the brake on the hormone production of another part of the brain (the pituitary gland) and a number of hormones, such as ACTH, are excessively produced. This can result in a variety of symptoms such as developing an abnormal coat, a big belly or fat deposition above the eyes. The loss of muscle despite training can also be striking. Horses with PPID become more sensitive to infections and inflammation. This also makes the dermis more easily inflamed, resulting in laminitis. PPID is more common in older horses, but can also occur in younger (sport) horses.

Diagnosis can be made based on clinical symptoms and blood tests.

Insulin resistance
Another metabolic disease that can cause laminitis is EMS (Equine Metabolic Syndrome). The main risk factor for EMS is being overweight. Excessive fat storage can be found in the neck and on the body. In case of obesity, insulin resistance can develop and the pancreas will produce extra insulin. This increased amount of insulin in the blood is thought to affect the blood vessels and cells in the dermis of the hoof, causing the horse to develop laminitis. There are many environmental factors that influence the onset of EMS, and there is also a genetic component that makes some horses more susceptible to this condition than others.

Metabolic disturbances
In severe colic, damage to the gut can occur. The intestine can lose part of its protective function and toxins from the intestinal contents can seep into the bloodstream. Via the blood vessels they enter the small vessels of the hoof and can cause laminitis. Inflammations in the rest of the body can also spread to the hooves. Consider, for example, a mare

A radiograph showing severe changes in the foot due to chronic laminitis.



By taking x-rays with a contrast medium in the blood vessels, the circulation in the foot can be assessed.

that develops an uterine infection when the placenta does not detach quickly enough after birth. But wound infection, abscess or intestinal infection (horses with diarrhea) can also be causes. In general, any disease that causes a high fever or major metabolic disturbances can cause laminitis.

Mechanical causes
The cause of laminitis can also be mechanical. Frequent bruising of the sole or overloading of one leg can cause the blood vessels under the sole to be contracted or damaged. Due to the reduced blood flow of the dermis, laminitis can subsequently develop. The risk is greatest when a horse suffers a serious, acute tendon injury, suffers a fracture, has nerve damage, or due to any other reason that requires it to stand on its other leg for an extended period of time. Where laminitis usually occurs in either two or four legs, in this case it may be that it develops in only one leg.

Research on corticosteroids
In recent years, many studies have been conducted into the possible side effects of corticosteroids. No indications were found that there is an increased risk of laminitis after treatment with corticosteroids (for example in joints, orally or by intramusclar injection). If the horse has one of the previously mentioned underlying metabolic conditions (for example PPID or EMS), there does seem to be a higher risk of this side effect when corticosteroids are used.

It's all about the underlying cause
In order to have the best possible chance of recovery, it is very important to identify and resolve the underlying cause of the laminitis as soon as possible. After this, it is important to get the inflammation in the dermis under control as quickly as possible and to adjust the management in such a way that the chance of coffin bone rotation is minimized. The earlier the diagnosis and subsequent measures are taken, the greater the chance of recovery. Laminitis is therefore an emergency, especially since the condition can lead to death when the coffin bone punctures through the sole.

Rotation of the coffin bone
The deep flexor tendon is a very strong tendon that attaches to the back of the coffin bone, while a much thinner (and less strong) tendon attaches to the front. The force that the deep digital flexion tendon exerts on the coffin bone is therefore much greater than that of its frontal counterpart. When the connection of the laminae in the hoof is lost, the coffin bone will therefore tend to rotate and the base of the coffin bone will no longer run parallel to the sole. When the entire attachment fails, the coffin bone completely sinks into the hoof shoe. In that case, the prognosis is severe. The prognosis is also very poor when the tip of the coffin bone rotates so far that the sole punctures and the bone becomes visible.

Footwork
In addition to resolving the underlying cause, treatment may include anti-inflammatory medication/painkillers and medication that stimulates circulation in the hoof. In addition, extensive cooling can have an anti-inflammatory effect and provide pain relief. Think of buckets/packs with water and ice cubes in which the horse is placed up to the front knee (or the hock). Hand walking can stimulate blood circulation, but can only be done when the connection between the coffin bone and hoof wall is strong enough. Trimming the toe of the hooves down can facilitate break over and by adjusting this the deep digital flexor tendon exerts less force on the coffin bone. This effect can be further enhanced by adjusting the shoe. By applying a reverse shoe, the break over point can be brought even further back. The sole can be protected by combining this shoe with a leather inlay and foam.

Individual treatment
However, no 'one size fits all' treatment is available for laminitis. The stage and extent of the inflammation, the underlying cause, the shape of the hoof and the position of the coffin bone make that each patient has his individual needs and must be approached individually in order to draw up an optimal treatment plan. The effect of this plan should be evaluated daily and adapted to the findings. Taking x-rays is therefore of great importance, in addition to the clinical findings.

On the long term
When a horse has recovered from laminitis, it remains more susceptible to develop the condition again. This is because the blood vessels and the laminae in the hoof have often sustained damage. By taking x-rays with a contrast medium in the blood vessels, the circulation in the foot can be assessed. The (chronic) strong pain stimulus that is caused by laminitis also causes nerve damage. This often leads to a typical movement pattern (a stiffer gait/less suppleness, possibly in combination with upward flick of the toe).

Conclusion
As you have seen, laminitis is certainly not a condition that only occurs in overweight ponies. Unfortunately, sport horses are also affected by this disease. It is very important to determine the underlying cause as soon as possible and to establish an individual treatment plan. ■

THE VETERINARIANS

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ABOUT SMDC
Sporthorse Medical Diagnostic Centre (SMDC), based in the Netherlands, is a multidisciplinary centre of excellence where all orthopedic diagnostic and treatment modalities can be utilized in combination with experience, extensive knowledge and individual attention. Dr. Bergman, Dr. van Toor, Dr. Cokelaere, Dr. Hoogelander and Dr. van Veggel dedicate their time to optimize sporthorse performance while considering all factors which might influence it. Their caseload contains horses showing lameness but also includes horses with spine related problems, pre-purchases examinations as well as preventative sporthorse care. www.sporthorsemdc.com