

# Laminitis – The Facts

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**Laminitis** will be a familiar term to most people who ride horses. For many it conjures up the impression of an overweight pony that develops painful feet a few hours after eating too much spring grass. Laminitis, however, is a very serious veterinary condition which can strike ponies and horses of any age and, although often only mild, can have devastating consequences leading, in some cases, to the animal's death.

## **So what exactly is laminitis?**

The simplest way of thinking about laminitis is a painful condition which is associated with inflammation and damage to the sensitive structures (laminae) of the horse's foot. To understand the disease further we must think of it as condition with two components. The first phase of the disease, known as the **acute phase**, starts a few hours before lameness begins and continues as lameness develops over the first 48 hours. The second phase of laminitis, known as the **chronic phase**, occurs if the inflammation in the sensitive laminae persists for longer than 2-3 days. If the damage to the laminae is so serious that it causes separation of the laminae tissues then the pedal bone may lose its firm attachment to the inner surface of the hoof wall resulting in the most serious consequences of laminitis which involve either the pedal bone rotating downward or, more rarely, the pedal bone sinking in the hoof capsule.

## **Understanding the normal structure of the foot**

We must know something about the normal equine foot and how its individual tissue work to understand what happens when laminitis strikes. The hoof wall is a horny outer structure of the foot which grows down from the coronary band. The hoof wall surrounds the pedal bone and is attached to it, on its inner surface, by a series of interlocking tissues called laminae. Since the feet support each limb, the entire body weight of the horse is actually carried by these laminal attachments within each foot. The laminae attached on the hoof wall (insensitive laminae) have no blood supply and no pain receptors but the laminae that attach to the pedal bone are living tissues which require a blood supply and are richly provided with nerves. The blood to maintain these sensitive laminae comes from the two main blood vessels in the foot which branch into a smaller network of vessels throughout the foot. If anything abnormally disturbs the blood flow to the foot it will deprive the laminae of vital oxygen and nutrition that can cause inflammation within the laminae of the foot and result in first (acute) stage laminitis.

## **What causes laminitis ?**

It is thought that a sudden change in diet causes a shift in the normal bacteria in the large bowel of the intestine which results in a new population of bacteria that can produce toxins that are released and absorbed into the blood stream. These toxins circulate around the body and have direct effects on blood vessels in many tissues. The most obvious direct effect of the circulating toxins is to cause activation of several destructive enzymes in the region of the sensitive laminae in the foot. The damage that these activated enzymes cause (they literally dissolve the links between the laminae) causes inflammation and swelling in the laminal tissue that has secondary effects of altering the blood flow to the foot (hoof temperature increases). The inflammation in the laminae causes activation of the sensitive pain receptors in the foot and affected animals develop lameness. Although changes in the bacteria in the intestine are the most common source of the activating toxins other causes are also well recognised and include toxins from retained placenta, a severe uterine infection following a difficult foaling, toxic shock, peritonitis or liver disease can all have secondary effects on the laminae of the feet. The use of corticosteroids in horses is also known to occasionally sensitise the laminae to the effects of circulating factors that can precipitate a laminitic episode.

Not all cases of laminitis are caused by toxin activation. Excessive concussion during road work can result in traumatic damage and inflammation of the laminae which will lead to laminitis. Horses with a long standing injury to one limb may have to carry an increased proportion of their body weight on their opposite good leg and can develop what is termed weight bearing laminitis - this is a complication seen occasionally in horses following surgery to repair fractures.

## **Treatment of acute phase laminitis**

Whatever the underlying causes of the damage to the sensitive laminae, treatment is aimed at rapidly suppressing the inflammation and reducing the pain suffered by the patient. Acute laminitis is, therefore, a veterinary medical emergency and the sooner the inflammation can be reduced the less damage will have been permanently done to the vital structures within the foot. Management of acute laminitis depends upon the cause of the clinical signs. If over feeding with concentrates or spring grass is considered to be the primary problem then the pony or horse must be moved to a stable or loose yard where its diet can be strictly monitored and controlled. In addition to reducing the diet, drenching the horse/pony with liquid paraffin may help to remove the abnormal, toxin producing, bacteria from the intestine and allowing a return of the normal intestine bacteria. If a uterine infection is identified following foaling then antibiotics and uterine wash-out would be appropriate. Administration of intravenous anti-inflammatory medication, by your veterinary surgeon, can help to quickly reduce the pain and inflammation which will relieve the animals suffering and minimise the damage to the sensitive laminae of the foot. They can also be helpful in preventing circulating toxins from causing further damage to the laminae until they can be cleared from the blood stream by the liver and the kidneys.

Supporting the foot by transferring weight temporarily onto the frog and away from the damaged laminae can be very effective at relieving some of the discomfort. This can be most easily achieved by applying frog pads and moving the patient to a shavings\sand bed. The feet can be tubbed in ice cold water or cold hosed during the first few hours to reduce inflammation but contrary to older tradition it is now thought that animals suffering from acute laminitis should not be forcibly exercised since this just mechanically damages the sensitive laminae even further.

## **Treatment of chronic phase laminitis**

If the acute laminal inflammation causes severe damage to the laminae the pedal bone will lose its normal attachment to the inside surface of the horn capsule and the tip of the pedal bone will begin to rotate towards the ground. It is at this stage in the laminitis episode that the pony or horse is considered to have entered the chronic phase of laminitis. During this phase it is not the inflammatory enzymes, but the mechanical forces, that are now causing the laminae to separate away from the horn wall. The pedal bone rotates in this manner for several reasons. The attachments at the toe are the most badly affected structures in the foot. This leads to separation occurring at the toe which is then made worse by the pull of the deep flexor tendon, attached at the back of the pedal bone, which increases the rotation. During this early phase of rotation it is crucial that the pony/horse is given a deep bed to encouraged lying down to rest the feet as much as possible until the rotation stops and the pedal bone position stabilises. Once rotation has occurred then the pedal bone cannot be returned to its previous position in the hoof capsule. The management of the chronic phase of laminitis is a very difficult problem which requires close collaboration between the veterinary surgeon and the farrier. Radiographs can be taken to demonstrate the degree of pedal bone rotation within the foot and this information can be used to allow the foot to be trimmed carefully so that the new horn, growing down from the coronary band, is encouraged to re-attach to the pedal bone in its new position. It must be remembered that the coronary band blood supply is also damaged by laminitis, especially at the toe, which results in an alteration in rate of horn growth of the hoof wall. Initially the damaged toe region grows horn very slowly while the less damaged heel area grows normally causing the foot to become upright unless the heel is trimmed carefully. The heel must only be lowered, however, when any pedal bone rotation has stopped and the foot has become stable. It often takes months of careful farriery to return the foot to a relatively normal appearance. Shoes should be fitted long and wide at the heels to give support to the foot in the area least affected by the damage to the laminae. The value of using special shoes at this stage, such as the heart bar shoe, which give the foot support by transferring weight onto the frog can be of real value provided they do not cause excessive frog loading which can result in frog necrosis.

Nutritional supplements containing the correct proportion of the biotin, methionine and calcium, required to encourage optimal horn growth, are also very useful at this stage in the treatment of chronic laminitis.

## **Prevention of Laminitis**

If the laminitic process has been caused by overfeeding, causing rapid change in gut bacteria, then the management of the diet of a horse or pony is critical to prevent further episodes. Ponies should have their access to rapidly growing rich grass severely restricted and their diet supplemented with hay. If the rations of animals prone to laminitis can be reduced and strictly controlled then the individuals can often be maintain in work for many rewarding years. When diets are restricted in this manner, however, it is very important to provide a daily vitamin and mineral supplement (V-Biotic by Equine America) to ensure adequate intake of these vital trace elements.

Anecdotal evidence suggests that feeding low levels of herbal feed supplements containing anti-oxidants can have a very significant effect at reducing the recurrence of laminitis in animals known to be at risk. The use of anti-oxidants as part of the overall management of animals that have suffered a laminitic attack has been helpful in recuperating them back to athletic soundness.

Wherever possible it is far better to prevent laminitis developing because damage to the laminae may be irreversible and often leaves animals with permanently sensitive and painful feet.

## **What is the athletic future for my laminitic pony or horse?**

The severity of the pedal bone rotation will determine the future athletic ability of the horse or pony suffering from laminitis. **If the pedal bone rotation can be reduced to a minimum by effective prevention methods and/or rapid and effective veterinary treatment then the prospect of the horse/pony returning to being a normal athlete are often quite good.**

Treatment of mild to moderate pedal bone rotation is not always completely successful but often the animals can be made comfortable but will remain sensitive in their feet with a potterly gait, particularly on cornering. If the pedal bone rotation is severe, particularly if the tip of the pedal bone has penetrated through the sole, then the prognosis for the pony or horse is extremely poor and it is destined to many months of very painful suffering if treatment is attempted. These animals are always salvage cases and will never have a normal gait or be able to perform any form of normal athletic functions but treatment may be appropriate if the pony is a much loved companion.

The old adage "No foot no horse" is particularly pertinent in the case of laminitis. Owners often consider laminitis as a minor problem because most animals that have mild attacks will usually improve rapidly with treatment but it is vital that we do not forget the devastating potential consequences if the laminitic attack is severe. Prevention is definitely the most important consideration in animals prone to episodes of laminitis.