



Sports Medicine, Lameness, Reproduction and Dentistry

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## Laminitis

The equine foot is a complex structure made up of blood vessels, nerve bundles, joints, ligaments, tendons, hoof wall, and laminal connections. The equine hoof is a modified “fingernail” surrounding the coffin bone and is attached to the bone through an intricate connection of primary and secondary lamina (interlocking finger like projections). As the hoof capsule grows, it starts at the coronet band and grown down toward the ground. It is then either trimmed by the farrier or chipped away as the capsule lengthens. Laminitis is the medical term for inflammation of the lamina, or finger like projections. When the lamina become inflamed, the interlocking projections lose their strong connections and the lamina begin to come apart (similar to a zipper unzipping). As the connection on the dorsal (top/front) of the coffin bone begin to come apart, the backwards pull of the deep digital flexor tendon pulls the coffin bone away from the hoof wall and the tip of the coffin bone turns towards the ground. This leads to the “rotation” of the coffin bone seen on radiographs. The downward force of the horse’s body weight will also push the coffin bone down towards the ground, giving the “sinking” effect of the coffin bone. The degree of rotation and sinking is different for

each horse, and will lead to differences in treatment/correction, and prognosis for recovery.



Figure 1 before treatment

There are many causes/diseases that can lead to laminitis, but the cellular/microscopic reasons for founder are still not completely understood. There are several theories, such as: decreased blood flow leading to necrosis (death of tissue from lack of blood), endotoxic break down of laminal connection, cellular dysfunction leading to cellular break down, and many more. The point of this paper is to not dig deep into the cellular destruction of the lamina, but rather to note the major diseases/disorders that lead to laminitis, and how to combat and correct laminitis when it is present in your horse

There are distinctive clinical signs of laminitis that a horse will display. The most common is the “laminitic stance”. The horse will rock back onto its hind limbs and stretch the front limbs out toward their head. There will also be increased heat around the coronary band/hoof wall, and bounding increased digital pulses. Many horses will be reluctant to move, and if they do, they will act as if they are walking on nails. They will have a short choppy gait with only upward



movements and minimal forward/backward movement of the front limbs. Minor cases of laminitis may not be as evident. Changes in the horse's stride length (shortened), reluctance to walk on hard surfaces, and slight increase in heat are all mild or early signs of laminitis.

There are three major categories that can cause laminitis in our equine patients. The first and most common cause is metabolic founder. Metabolic founder is laminitis caused by a metabolic disease such as Equine Metabolic Syndrome (EMS) or Pituitary Pars Intermedia Dysfunction (PPID). Recognition, diagnosis, and treatment of these diseases can be performed before clinical laminitis is present, but for the majority of our patients, the clinical signs associated with laminitis are the reason the veterinary is called out to examine the horse. (More information specific to EMS and PPID can be found in the EMS and PPID papers at [www.crumequine.com](http://www.crumequine.com)). To treat this form of laminitis, not only will attention need to be given to the inflamed feet, but the inciting cause needs to be identified and then corrected with diet and medications (dependent upon the disease). The second cause of laminitis is overload, or increased weight bearing on one or more limbs. This is often times found in patients who have had an injury to one or more limbs and the discomfort of the injured limb causes the horse to place more weight on the healthy limb. The increase in pressure will cause decreased blood flow to the foot causing necrosis (death) of the lamina. This form of laminitis has an obvious correction, but is often times very difficult to achieve due to the injury on the opposite limb. The third cause of laminitis is a broad category which includes infections, overmedication with steroids, and colics. There are several infections such as Potomac horse fever, enteritis (inflammation of the small intestine), Salmonellosis, and septicemia which all can lead to laminitis. High levels of steroids such as dexamethasone, triamcinalone, etc. can also lead to the development of laminitis. Depending on the inciting cause, the treatment would be to correct the cause (ie treat the infection/stop the steroid injections) and then treat the affected feet.

So the next question would be; how do we fix the feet once the inciting cause has been diagnosed and is being treated? With laminitic patients we want to stop the inflammation, with minimal NSAID usage (If a horse is too comfortable they can cause more mechanical damage when there is loss of stability of the lamina). We then want to stop any rotation and sinking that is occurring. To help assist with correct shoeing, digital radiographs and measurements will be needed to evaluate the severity of the founder, and gather the information necessary to properly shoe the horse. Finally, the veterinarian and a qualified farrier should work hand in hand to properly place heart bar shoes (or any other shoe necessary) on the affected limbs. The heart bar shoe when properly placed will apply



Figure 2 Following treatment

pressure to the frog and digital cushion which will in turn apply pressure to the base of the coffin bone to decrease the sinking and rotation. Each horse is unique based on: the degree of laminitis and mechanical changes (rotation, sinking), time elapsed since the first signs of founder (acute or chronic), and the cause of the founder (metabolic, infectious, weight bearing abnormalities). It will be up to the veterinarian and farrier to determine the best course of action.

The key to any founder horse is to notice the clinical signs, find the cause, and to treat the laminitis as soon as possible in the most effective way. Laminitis does not mean death like it has in the past. It is a challenging disease, but new understandings and discoveries are being made with the increased knowledge gained through research. It is a disease of management and proper understanding. Your horse can still live a long and productive life after a bout with laminitis. If you have any questions or concerns about your horse and the possibility of laminitis please talk to your veterinarian during your next exam. One ounce of prevention is worth a pound of cure.