Pathological Effects of Horse Shoeing

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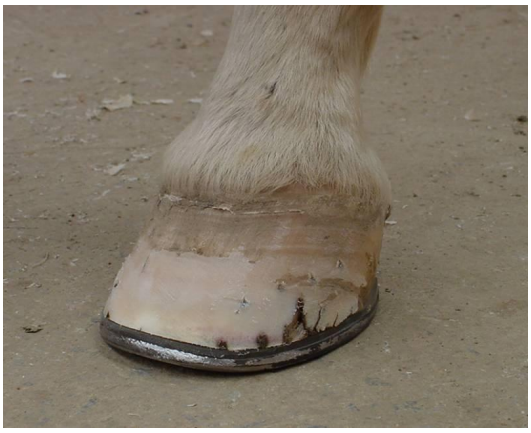


Since horse shoes were designed by medieval blacksmiths with available materials, and not by modern biomechanical engineers with the horse's hoof physiology in mind, there are a number of biomechanically pathologic effects of horseshoes.

Interestingly, little has changed about the horseshoe since its original medieval design.

When the shoe is applied, it does not allow the hoof to flex. This causes decreased blood flow into and out of the hoof, depriving nerves of blood supply thereby resulting in the hoof becoming numb. The shoe is usually made of steel, it is very inflexible, and is solidly fixated to the hoof. The vessels that supply the hoof with blood are also compressed decreasing the efficient blood flow into and out of the hoof. The limited blood flow causes waste products to build up in the hoof, minimizing nutrients and oxygen from entering, which in turn, causes decreased cellular metabolism and tissue growth.

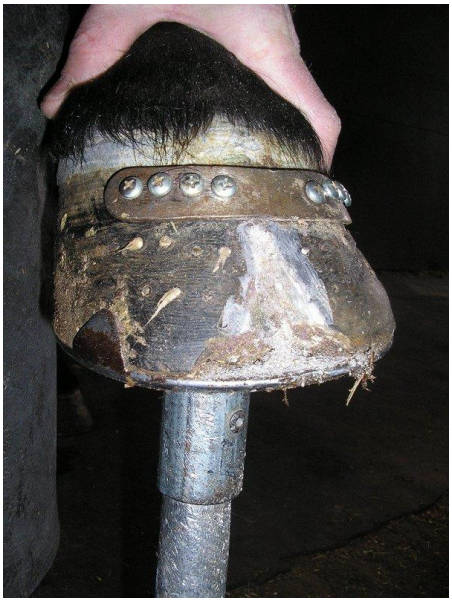
In addition, as described above, the horses hooves cannot contribute to general circulation when they are restricted by horseshoes and confinement.

This tourniquet effect of horseshoes was dramatically demonstrated in a video produced in 1993 by Dr. Chris Pollitt Phd DVSc MSC of the Department of Companion Animal Medicine and Science, University of Queensland Brisbane Australia . This investigator using freshly prepared cadaver horse hooves compared shod and non-shod specimens measuring blood flow. The application of shoes resulted in a visible dramatic reduction in blood flow and alteration in the physiology of the horse's hoof. Despite the obvious implications of this work, it has not affected the veterinary or farrier practices within the horse community significantly.

In addition, and as a result of, the previously described macro vascular alterations, shoes anesthetize the hooves by affecting the micro vascular blood flow. The shoe does not allow the hoof to flex which causes limited, inefficient blood supply to the hoof. This limited blood supply does not allow ATP to enter the neural cells within the hoof causing the nerve cells to not be able to fire. When the nerve cells cannot fire, the hoof becomes numb. This scenario is like when a human sleeps on their arm and they wake up not being able to feel it because the blood flow has been greatly decreased by pressure from the body weight lying on it.

Reduced blood flow deprives the horse of any proprioceptive sensory input from the feet, leading to pathologic gait changes. In addition, although the limited blood flow and resulting anesthesia to the hoof allows the horse to continue to be used; the horse does not feel the pro-

gression of pathologies inhabiting the hoof, until it is often too late to cure these conditions.



Once the pathologic situation has progressed, the nervous tissue in the heel region of the hoof detects the damage, the horse's owner resorts to pain relieving drugs. These drugs also have adverse effects on the horse's digestive system, kidneys and liver. Horse owners will also resort to having surgery performed on their horse to cut the nerve that supplies sensation to the hoof. Once the nerve pathways grow back over a short time, the horse begins to sensate the pain; the drugs can no longer mask the great pain and the horse is then euthanized.

As described above, the first problem is that box stall keeping is the "norm" of owners as well as professionals such as trainers to house their horses. This is done not in the interest of the horse but for the convenience of the owners. The horse is kept in the stall so that the owner or trainer does not have to go out and "catch" the horse in order to interact with it.

This practice, because it is so foreign to the horse's natural lifestyle, causes most of the problems described above, and the clinical problems listed below. Stall keeping does not allow the horses movement to wear its hooves off naturally; combined with a metal plate, the shoe, disallowing natural wear.

When the hooves grow and cannot naturally wear; a structure of the hoof, called the bar, is driven up into the interior of the hoof capsule, pinching and crushing the corium, which is the soft innervated portion of the hoof. This pinched corium causes great pain to the horse. It is like walking with a rock in your shoe. The horse may then adapt abnormal gait patterns further exacerbating the problem or causing other gait related lameness problems.

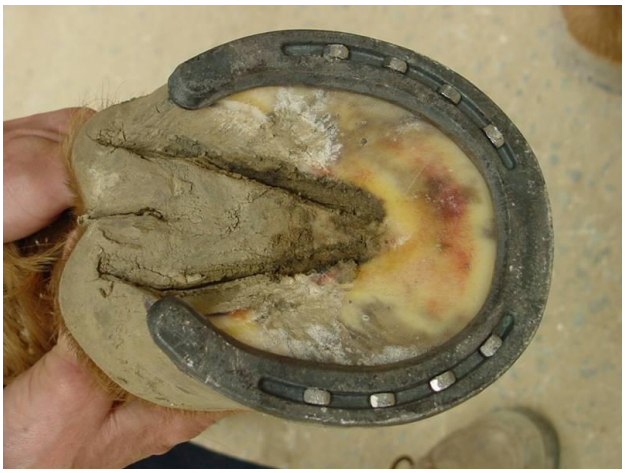
This method of horse keeping is accepted throughout the US and the world.

Once a lameness (alteration in gait) or hoof abnormality problem is identified, veterinarians, farriers and other horse professionals typically evaluate the horse's hoof from the wrong paradigm. Rather than identifying methods to return the horse's hoof to a more natural state as part of both, preventative as well as treatment approaches, the horse's hoof is either managed as a non-biological structure by farriers, most of whom have no formal education in biology, or medically managed by the veterinarians.

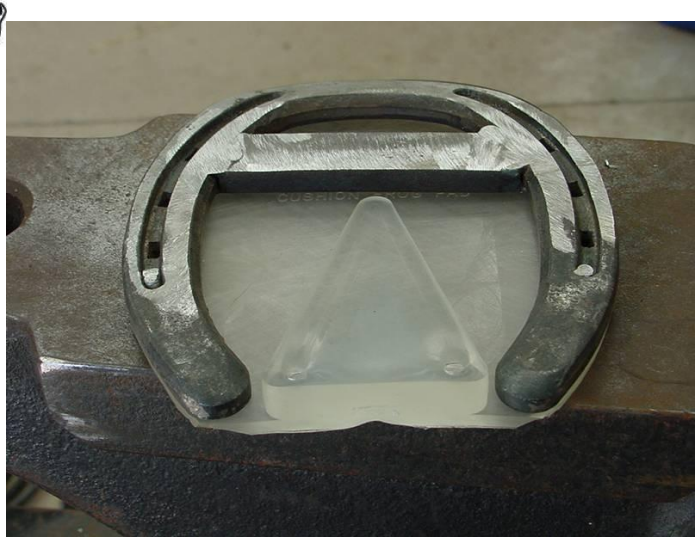
Medical management by the veterinarians falls into one of three categories. Many horse veterinarians are undereducated or not comfortable with hoof and lameness problems. These vets often refer the entire lameness problem back to the farrier. As described above, most farri-

ers have no formal biologic training and many are practically self-taught. Despite their lack of biomechanical training, treatment usually consists of radically altering the biomechanics of the hoof through either aggressive trimming techniques, or specialized shoes.
Other veterinarians may adopt a medication strategy. These veterinarians use medications, either systemic or locally injected to anesthetize the pain, which temporarily preserves use but ultimately shortens the useful life span of the horse by accelerating the original hoof condition. This approach although officially considered "illegal", is commonly practiced surreptitiously by veterinarians who work in association with professional trainers in horse racing, and other equine competitive events.
Finally some veterinarians, usually considered "experts" by their peers will perform radical hoof surgery such as resection or grooving. As one can imagine, in an animal that is specialized by evolution to bear weight, be in a herd, and walk in order to remain in optimal health, most of these radical procedures have an unpredictable track record at best.

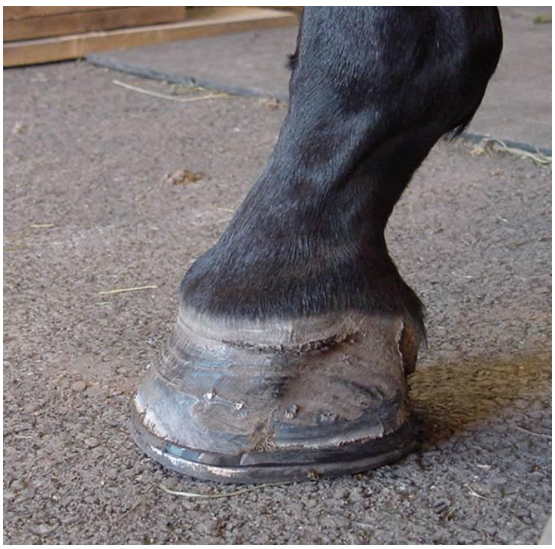
Results of Current Conventional Lameness Treatments



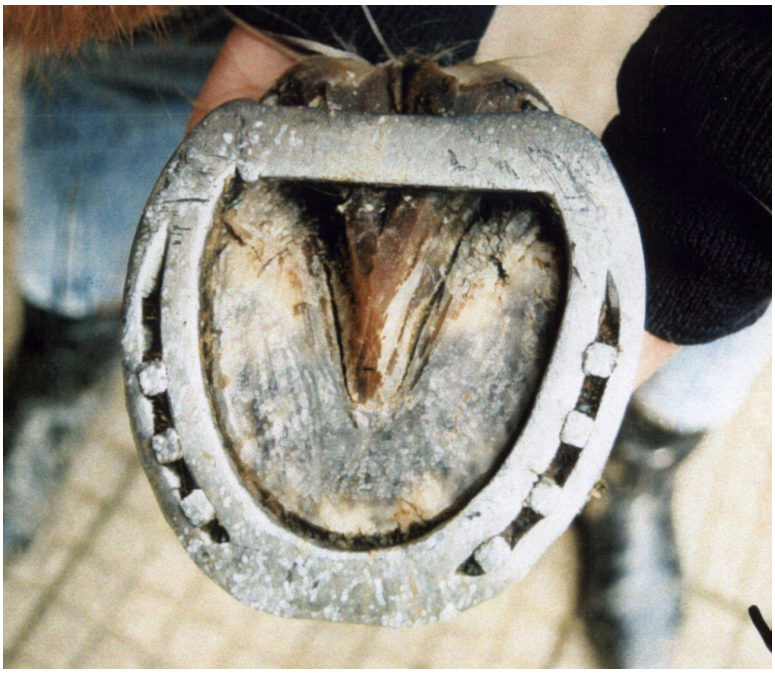
Below are a few examples of common causes of lameness, which vary from significantly challenging, to impossible to treat by conventional means. As you would expect from the discussion above, these conditions are seldom found in wild horses.
One of the most common lameness problems in our stall-kept or shod horses is Navicular Disease, or Navicular Syndrome. Put simply, Navicular Syndrome is caused by a lack of proper hoof mechanism (the physiologic expansion and contraction of the hoof as a result of weight-bearing) due to shoeing, improper hoof trimming, confinement, and the inability to wear naturally.
this situation actually gets worse. This is because the hoof is a growing living structure and never remains static. In the wild this growth is counterbalanced by physiologic weight-bearing for over 20 miles per day.
In the domesticated horse, when the hoof is improperly cared for, a structure in the center of the hoof, called the bar, grows too long. The long bar impacts into the interior of the hoof. This overgrowth causes pinching of arteries and inflammation to surrounding tissue, the corium. The pain caused by this process becomes intolerable and the horse goes lame. It is the physiologic equivalent of walking with a stone stuck to the middle of the bottom of the hoof.
The common treatment for Navicular Syndrome is “orthopedic” shoeing. The shoeing can remove the pain by decreasing the blood flow



into the hoof. This reduced circulation causes inhibited nerve function, and the horse seems to become sound (for a while), though the damage continues to progress. A human example of reduced blood flow to an area that causes numbness is when a person falls asleep on their arm and wakes up with no sensation in it.
Another common treatment for Navicular Syndrome is the use of drugs, which are intended to decrease pain and inflammation. These drugs also have adverse effects, stomach ulcers, decreased appetite, and are toxic to kidneys and liver.
Navicular Disease is labeled as a "degenerative disease" by conventional veterinary practice. It is considered to have no cure with the goal of treatment being to keep the horse usable as long as possible. When the numbing techniques are no longer effective, the horse's nerves that supply the hoof are severed or euthanasia is recommended. Something as simple as the education of horse owners, farriers, and veterinarians of the natural lifestyle and correct hoof trimming can prevent and reverse the "disease".
Another common lameness problem that is also considered to be degenerative and incurable is laminitis/founder. Laminitis is the inflammation of the structure in the hoof called the laminae. The laminae, is the "glue" that adheres the hoof to the bone.
"Founder" is when the bone pulls away from the interior of the hoof capsule. This condition is thought by many veterinarians to be related to systemic toxic and metabolic changes possibly related to nutrition. The more obvious local causes within the hoof biomechanically are ignored in these theories.
This condition is diagnosed when an x-ray is taken and shows separation of the toe wall from the toe area of the coffin bone (the bone which is closest to the ground in the horse's hoof). A horse whose hooves are natural and fully functional, whose circulation is normal and whose hoof shape is physiologically correct will not experience the common complications of laminitis or founder.
Some of the current conventional non operative treatments for laminitis are diet restrictions, stall rest, anti-inflammatory drugs and rigid, orthopedic shoeing to reduce circula-



tion in the hoof capsule.
A common operative treatment for founder, includes the barbaric cutting away the wall of the hoof, this is called "resection" or "grooving". This technique exposes the living coffin bone and its delicate covering to air and bacteria. The exposed laminar corium is then subjected to harsh chemical treatments, and tight bandaging.
Most founder cases become chronic due to the misunderstanding of the cause of the problem, compounded by inappropriate treatment; all caused by the lack of knowledge of the horse owners, farriers, and veterinarians. When the anesthetizing properties of drugs and shoes no longer have effect, euthanasia is recommended.
The natural treatment of laminitis/founder requires an understanding of shoeless hoof trimming methods to return the hoof growth to the normal state while at the same time protecting the hoof from undue mechanical influences. Only the natural technique of hoof trimming has shown an ability to accomplish this recovery of the hoof. This technique must be combined with natural horse management as described above to be successful.
It is also necessary to support the animal's metabolism, which may be damaged from the long-term use of ineffective, conventional treatments.
A third common problem that is often seen in shod horses, are hoof cracks. It is not uncommon to see these cracks treated with stapling, stitching, patching, gluing, bolting, or applying "corrective" shoes. It is not possible to have a permanent solution to these problems without proper living conditions, healthy hoof shape and physiologically correct barefoot trimming.
In reality, hoof cracks are the result of a combination of poor hoof form combined with the lack of local hoof nutrition brought on by immobilization and horse shoes. When a correct hoof shape is restored, the cracks grow out and no further lameness is experienced.



Pictures: HoofCare-UnLtd. and Fisher Lameness Foundation