



HEALTH ZONE

Hoof Care

White Line Disease

BY HEATHER SMITH THOMAS



PHOTOS COURTESY PAUL GOODNESS

White line disease is a progressive infection and separation of the hoof wall

tiple hoofs. It has been reported in almost any environment from dry/arid to wet/humid.”

People used to think it occurred mainly in wet, humid conditions, but it has been found everywhere. In the past, we didn't know what caused it, and horsemen just called it seedy toe.

“This problem is usually discovered by a farrier doing routine trimming or shoeing, or a veterinarian doing a lameness workup,” Goodness said. “It almost always is associated with some type of poor hoof conformation which can either be a cause or an affect. There is usually some kind of imbalance that puts stress/strain on the foot, causing distortion, and it may be this poor conformation that causes the initial separation.”

White line disease by itself does not cause pain or lameness. If the hollow area in the wall becomes extensive, however, there will be some separation of the hoof wall that compromises support for the coffin bone (P3).

“This generally results in some distal displacement of that bone,” Goodness said. “It tends to move or sink within the foot. The skeleton/leg bones depend on support from the whole hoof to hold it up, and if part of that hoof is compromised, something shifts and moves.”

This can result in lameness.

“There may be some laminar sheering, or solar compression by the bone—essentially bruising the sole from inside out,” Goodness continued. “This can happen very quickly. I recall an instance that occurred many years ago before I knew about white line disease, when I noticed a slight separation in the toe of a broodmare. She was heavy with foal, which put even more weight on the feet. I was in a hurry, building a practice, and I remember telling the barn manager that I saw a little separation in one of her feet but that I would deal with it next month. It was just a small thing. By the time I got back the next month, it was huge. Sadly, it was impossible to resolve. It took years of effort before we gave up on that mare, but she ended up being euthanized—just because I put it off a month. I had no idea that it could travel

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White line disease is the common term for a progressive infection and subsequent separation of the hoof wall—with the hoof wall coming loose from the underlying tissues. It usually starts at the bottom of the foot and travels upward as this area becomes hollowed out.

Paul Goodness, chief of farrier services at Virginia Tech's Equine Medical Center in Leesburg, Va., says this disease is an infection of the *stratum internum* or the junction between the *stratum internum* and the *stratum medium* of the hoof wall.

Travis Burns, lecturer and chief of farrier services at the Virginia-Maryland Regional College of Veterinary Medicine in Blacksburg, Va., says some people are confused about the name.

“White line disease affects the non-pigmented *stratum medium* of the hoof wall (the white zone between the outer hoof wall and the inner portion), and not necessarily the white line on the bottom of the foot,” he explained.

Dirt, debris, and bacteria can pack into the white line, especially if there is some separation due to spreading forces on the foot (such as a long, untrimmed hoof wall or toe). The problem is generally noticed first by the farrier. When the dirt/debris along the white line is removed with a hoof knife, an open undermined area is revealed, filled with powdery material.

“There may be rather large areas of separation inside a normal-looking hoof wall,” Burns said.

The cause is usually a combination of bacteria and fungi commonly found in the horse's environment—in the soil.

“This is what we find when that material inside the hoof is cultured,” said Goodness. “The infection usually (but not always) begins with some kind of separation in the hoof or intrusion into that area.”

The farrier usually finds an odd opening into the foot,” he said.

“This infection can affect any age, breed, or gender—shod or unshod,” Burns said. “It may affect only one hoof or mul-

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NEW BOLTON

Quarter cracks in the hoof are a frequent source of lameness for the Thoroughbred racehorse. The cracks compromise the integrity of the hoof capsule and can be painful or bleeding.

Potential causes include farrier practices, hoof imbalance, poor hoof quality, limb conformation, and traumatic injury. The cracks, located on the sides of the hoof, can originate from the ground surface or from the coronary band.

Most treatments strive to direct force away from the cracked area of the hoof. "Floating a crack" is a farrier term that describes leaving a space between the shoe and the hoof to reduce the force of weight bearing on the cracked region, usually using bar shoes, frog support pads, and sole support pads.

Mechanically stabilizing the crack is

also a common approach, both to alleviate discomfort and to allow new, normal hoof growth from the coronary band. One way is "lacing" with stainless steel sutures to pull the margins of the crack together. "Patching" a crack refers to using a composite of hoof adhesives and fibers, such as carbon fiber or fiberglass, to reinforce the region around the defect.

Several types of glue-on horseshoes have been shown to stabilize the hoof, or to reinforce the hoof capsule, and are often used when treating quarter cracks in racehorses. We at Penn Vet frequently use cuffed glue-on horseshoes, a product invented here at New Bolton Center.

By Patrick Reilly, Chief of Farrier Services, New Bolton Center, University of Pennsylvania School of Veterinary Medicine (Penn Vet)

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so quickly and affect a horse that severely. That lesson was hard learned.

"If it is not effectively dealt with early, the hoof-eroding infection can lead to *pedal osteitis* (bone infection) or laminitis, which was what led to the demise of that particular mare. If you suspect white line disease, it should not be ignored or treated lightly."

It should be dealt with immediately and thoroughly.

Causes

Several studies have shown that hoof-eating microbes (some of which are fungi) are opportunistic pathogens, which means the tissue must be somewhat damaged already, in order for them to invade. A typical way for this to happen is for the pathogens to become established in an old abscess tract, or an area where the white line is stretched or flared, due to a dish in the toe of the foot.

"Dirt and debris fill the separation, further exacerbating the problem by acting as a mechanical wedge that keeps forcing the wall apart," Burns said.

Microbes invade fissures in the white line and set up shop. The hoof wall is three layers: The *stratum externum*, *stratum medium*, and *stratum internum*. The inner portion of the *stratum medium* is attacked. The bottom part of this layer can be seen as the white line—between hoof wall and sole—when you pick up the bare foot.

The pathogens become established and digest horn tissue in the *stratum medium*. They may also invade a toe crack or quarter crack, or old nail tracks. Any hole or break that goes through that area can allow microbes to enter.

"The hoof wall separation does not affect the *stratum internum* or the dermal tissues," Burns said.

Severity of white line disease can range from small cavities in the white line on the bottom of the foot—that you see on the ground surface—to large hollow areas that extend all the way up to the coronary band.

"Lameness is only noted when there is extensive separation, resulting in instability of the coffin bone inside the hoof capsule," he said.

Sometimes you won't see a cavity if the microbes entered through a pinpoint opening higher in the wall. Then

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USING A HOOF PATCH

If white line disease has gotten well started, much of the area between the outer and inner wall may be eroded away (such as in the feet of a broodmare at pasture that isn't trimmed regularly or the feet checked closely).

"If the infected area can be debrided and treated daily, that's best," said Travis Burns, lecturer and chief of farrier services at the Virginia-Maryland Regional College of Veterinary Medicine in Blacksburg, Va. "If this is a horse that the owner can't treat daily, or if the environment can't be changed, the farrier can debride, treat, and then pack that area of the foot with antiseptic packing, and then cover the packing with a patch to keep it there and protect the foot from a dirty environment."

This is not the ideal way to treat white line disease, but in a pinch (like with a broodmare that's going to stay at pasture with her foal, or when a person has a large group of mares and isn't going to be picking out all their feet daily) it is a way to deal with this. You might not want to confine the mare and foal in a stall or small paddock, and using a patch can enable that mare to stay at pasture.

"The patch can be removed at the next trimming/shoeing and redone," Burns said. "This should probably be done every four to six weeks. As the foot gets longer and there's more leverage or distortion, this makes it more predisposed to white line disease. You want to prevent that, if possible. The patch on a treated foot will stay in place until the next trimming and then your farrier can deal with it and replace the patch."

Over time the foot should regrow a healthy wall.

By Heather Smith Thomas

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there may be a hollow area in the wall, with little or no sign at the ground surface. Or there may be a small tract at the ground surface and a huge cavity higher up the wall. If it only invades the middle layer of the hoof wall, you'll hear a hollow sound when the hoof is tapped; one of the old terms for this condition was hollow hoof.

Many horses have mild cases that can be completely trimmed out when you reset their shoes. The little pockets can be trimmed away.

"Many cases can be treated and managed by the farrier during routine visits," Burns said.

"White line disease has been reported all over the world in many different environments," he continued. "Many factors seem to predispose horses to white line disease, including poor environment, repetitive exposure of the foot to wet/dry, hoof wall distortions, flexural limb deformities, chronic laminitis, and weak/brittle hoof walls resulting from genetic or nutritional factors."

Treatment

Treatment is simple—just thorough debridement of the hoof wall in the affected area, removing every bit of the damaged horn, and then providing some type of supportive shoe to support/correct the hoof capsule distortion.

"Debridement is crucial," Burns said. "It should be cleaned out until you have a healthy-appearing margin. This exposes the area to UV light and oxygen, which is the most important thing."

The hoof-eating microbes thrive in a dark, anaerobic environment (without oxygen).

"After the area is debrided and clean, you can treat it topically with any number of antiseptic products like tincture of iodine, Thrushbuster, or chlorine dioxide," Burns said. "If the area is not debrided sufficiently, with a healthy-appearing margin, you are wasting your time and efforts because the disease process will continue."

It has to be opened up.

"There is no way you can put anything topical on the affected area that hasn't been debrided and expect it to work," Burns said. "Mechanical cleaning (debriding) of the area by the farrier is number one. After that, the owner/trainer should pick out the feet daily, brush them,



For cases that are neglected or go unnoticed in time for early treatment, more hoof wall may have to be removed to get rid of all the infected tissue

and do everything possible to get them clean, and then apply the topical medication of choice. Once a day is adequate as long as the foot is in a clean, dry environment and exposed to air. Oxygen and UV light do the bulk of the work in clearing up the infection, and the topical treatment simply attacks the last hidden remaining microbes."

Goodness likes to use chlorine dioxide because it is gentle on healthy tissues and broad-spectrum. It tends to get into all the nooks and crevices where there might be

any remaining microbes.

"This takes care of anything you might have missed during the cleanup process," said Goodness.

"Once you have exposed and cleaned up the damaged tissue, don't let that area become overly dry as it is growing out," he continued. "The open area has exposed horny laminae, and, if that gets too dry, it creates more little cracks and opens up new avenues for infection to either become established again or continue," he explained.

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HEALTH ZONE

Hoof Care

“It helps to leave the debrided areas open to air and sunlight; you really don’t need to continually medicate it,” Goodness said. “But to be safe we usually use a topical antiseptic. I dunk these feet in

chlorine dioxide as an insurance policy.

“The way I treat new infections that are just getting started is to mix copper sulfate with a little blob of silicone, supersaturating the silicone with as much

copper sulfate as will stick, and pack the little fissures with it. Copper sulfate is very effective to nip most infections in the bud. If I see a little fissure, I scrape it out and pack it with the silicone/sulfate mixture and put the shoe on top of that to hold it all in place.

“When I get back again a few weeks later for the next trimming/shoeing, it’s usually all very healthy-looking,” he said. “If you can get away without chopping a big hole in the hoof, you are better off, especially if it’s a working horse that needs a strong hoof.”

For cases that are neglected or not noticed in time to treat early, more hoof wall may have to be removed to get rid of all the infected tissue.

“The lingering problems occur when farriers don’t recognize it when they see it and it is not treated early enough or aggressively enough,” Goodness said. “They may see a little hole or crevice but just slap a shoe back on without digging it out and treating it. Dealing with white line disease is often a matter of recognizing what you



If ignored, white line disease becomes progressively worse



He's been writing a story for thirty years.



are seeing, and treating it. The sooner you deal with it, the better, and it may be as simple as packing it with copper sulfate or a merthiolate-soaked gauze pad.”

After debridement, if there is enough healthy hoof wall a shoe can be applied. For larger and more extensive hoof removal, the farrier may need to create a special shoe to spread the load away from the hoof wall and onto the sole and frog.

“Once you debride that area you’ve weakened the hoof wall even more,” Goodness said. “We use various kinds of shoes, such as heart bars and sole supports, heel plates with impression material, pour-in pads or frog pads, to keep the hoof stable. The debrided area can sometimes be extensive enough that we have to use some medicated adhesive to rebuild a portion of the hoof wall to affix a shoe to.”

When there is not enough hoof wall to safely and securely attach a shoe with nails, a glue-on shoe can be applied.

“Serious cases in which there is not enough healthy wall to attach a shoe should be protected with a foot bandage or

the foot placed in a boot until there is sufficient wall to attach a shoe,” Burns said.

If the areas of separation must be covered by a shoe, they should first be cleaned and then packed with an antiseptic packing material.

“Here at our Equine Podiatry Service we use a mixture of oakum, Venice Turpentine, and copper sulfate,” Burns said. “Horses that will be maintained barefoot (with small separations) should have the affected portions of hoof wall removed, to prevent mechanical prying on those areas, as well as to prevent further packing of dirt/debris into the opening. This also allows the owner or trainer to clean and treat those areas daily.

“It is important to initiate therapies or treatment as early as possible. If ignored or untreated, white line disease becomes progressively worse. It is imperative for the farrier, when he/she notes a small area of white line disease, to go ahead and debride and treat it immediately.

“Some horse owners and trainers don’t like to see defects in the hoof wall, and may

not want an infected area trimmed away, for cosmetic reasons (or they might think it weakens the wall when the horse is running),” Burns explained. “They may put pressure on the farrier to ignore it or just do minimal treatment rather than opening it up. But it is important to do this early on or it will become much worse, require more wall removal, and take much longer for the hoof wall to grow back. It’s best to deal with this type of infection while it is still small.”

Burns emphasized the importance of keeping the feet regularly trimmed or shod so that they don’t get too long and out of balance, which puts more pressure on various parts of the foot—and stresses that predispose the hoof to white line disease.

“The racehorse industry is pretty good about routine trimming and shoeing,” he said.

Also, if the farrier is working on the feet regularly he/she will be aware of any early signs of white line disease and it can be dealt with quickly. **EH**

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chapter in two minutes.**



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