

A Case of Onychomycosis in a Friesian Gelding

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Onychomycosis is fungal infection that attacks nails. 'Onycho' means fingernail or toe nail, 'mycosis' means disease caused by fungus. In the case of the equine hoof, onychomycosis[1,2] is normally referred to as white line disease (WLD). Despite its name, WLD involves the non-pigmented inner hoof wall and not the white line of the hoof. The white line (or zona alba, stratum internum) is the junction between the wall and sole.[3]

A 17-hand 14-year Friesian gelding presented to us after clinical evaluation ruled out metabolic issues. All four hooves were affected by WLD with the front hooves showing most of the damage. The initial shoeing method consisted of hoof wall resection, elevating the heels via wedge pads and application of banana (rocker) shoes along with gluing and casting material. The fungal infection was no longer active at the time of my initial shoeing at the end of July 2017. The exact cause for the WLD onset was not determined. It was reported to me that this 17 hand Friesian gelding had been left barefoot for the winter season as usual. The gelding was normally shod for the rest of the year. The winter of 2016/2017 was unusually wet, and this may or may not have contributed to the white line issue.

The gelding was very reluctant to move upon arrival at my facility. After shoe removal, the four hooves showed signs of unresolved damage due to WLD -- the right front being the most affected and is shown in this article. All four hooves had abnormally high heels even for a Friesian. For such cases, my approach is to first lower the heels to the level of the exfoliated frog. I then remove toe length while

assessing how and when to remove damaged walls. I tend to work in increments. My goal is to find a balance between removing impaired tissues and leaving some to provide strength and support to the hoof while healing. Full debridement is not always necessary.

Trimming and shoe placement are done by using an orthographic (perpendicular) projection after palpating the coronary gaps. The capsule -- being a three-dimensional asymmetric object -- is not always easy to assess. The hooves are then thoroughly disinfected and cleaned prior to packing the caudal aspect of the hoof with dental impression material (DIM). I rarely pack hooves forward of the apex of the frog. In this case, shoe support was provided by using EponaShoes. At the time of the first application and after careful hoof testing, the area around the apex of the frog showed signs of pain on all four hooves. The shoes were ground on the sole side adequately to avoid any chance of sole pressure. I tend to support such hooves progressively, at first with a more cushioning approach, and later, as the pain disappears, with somewhat firmer support. It is always advisable to use caution while providing sole support and packing hooves since no two hooves are the same. The ground side of the shoes were also prepared to provide adequate rolling at the shoe periphery. Rolling is done at the heels and toes, and the pitch is adjusted as called for by the situation. A light roll was also applied to medial and lateral sides of the shoes which helps to ease the mechanics of limb ad/abduction. A small ribbon of glue was applied onto the shoes. I limited the amount of glue on some areas of the hooves to allow better air circulation to certain regions. Finally, four nails were applied to further secure the shoes. My goal is to make the horse as comfortable as possible so that it starts to move as much as possible. Natural range of motion is an important key to healing. By December 2017 there was only a very small indication of wall damage

and by March 2018 there was no longer any signs of damage. The gelding was videoed after each shoeing, and we noted that its gaits and comfort kept improving after each shoeing.



Figure 1: Frontal photos: July 2017, Dec 2017, March 2018

A Few Details...

It is interesting to keep in mind that the hoof capsule can be considered as a specialized form of skin [4, 5]. Skin healing is not significantly different in horses than in other mammals such as humans. Skin has a high amount of plasticity and responds to physical stimuli which in turn are converted into biochemical responses. These responses can be healing or, if the stimuli is too severe, can be harmful.

There is also a subtle distinction between repair and regeneration. Repair is an incomplete tissue repair whereas regeneration is a complete replacement of damaged tissues to their initial qualities. Excessive hoof debridement, which includes invading soft tissues can create scars which may impair the long-term full function of the hoof.

In this example, the hoof seems to have regenerated but it may not be the case for all hooves depending on the general health, hoof care history and genetics of a particular horse. Unfortunately, hoof quality

seems to not be a priority in breeding programs. Riding horses at too young an age may also not be conducive to quality hooves.

It is important to keep in mind the innate function and evolution of the hoof [6]. For instance, the equine digital cushion is not just a vestigial leftover from the early four toed horses -- it still functions as a pad to some extent, hence the hoof capsule should be maintained under the bony column to allow some loading from the limb onto it.

Both the hoof capsule and bones are somewhat asymmetric. Add to this, the fact that the capsule deforms due to applied loads. It is therefore not always obvious how to map a hoof adequately. Using an orthographic projection of the articular area between the second and third phalanges gives a means to do a 3D analysis of the hoof and may prevent trimming to distortions [7].



Figure 2: Lateral radiographs: July 2017, Dec 2017, March 2018

The last layer of the epidermal capsule (stratum corneum) has a very complex architecture with specific mechanical properties. This layer is made up of dead keratin cells. I therefore want to use material that is closer to keratin's mechanical properties in order to help with healing. Finally, it is important to have radiographs not only to rule

out pathologies, but also to assess bone morphology. A flat pedal bone will not have the same needs as an upright one. Understanding the amount of concavity of the palmar aspect of the pedal bone [7,8] is very important when applying therapeutic shoes. The shape of P3 and its angle will define my shoe placement and amount of rolling (or not) at the shoe.

Conclusion

This case demonstrates favorable outcome even in a severe case of WLD by allowing the hoof to regenerate. Hooves regenerate like skin which has adaptive capacity to heal or not. Aggressive debridement is not always indicated.

No single approach can guarantee a spectacular outcome every time, but in most cases the ideas and approach outlined here will be effective. I have been applying this approach (and documenting it) for over 22 years while using metal shoes, composite shoes and/or leaving horses barefoot.

References

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