

Are We Treating Seedy Toe?

The old adage goes, before you can treat it, you have to know what “it” is. For lack of a better explanation or description, we group most infections of the toe as “seedy toe.” This conveniently included those pesky black holes at the very center of the toe. Over the past several years, I have come to notice an ever increasing incidence of this type of seedy toe. These black holes are always at the toe and at the connection of the white line to the sole. When advanced, these black holes will distort the white line and no amounts of trimming alleviate the distortion. Through dissection, it became apparent that the black holes are not simply bacterial infection brought about by seedy toe, but something totally different.

In 2001, I began removing hoof capsules from cadaver limbs for the purpose of teaching my students basic foot anatomy. On an average, I would see between 100 and 150 hooves a month. These specimens were from varying locations from around the United States and abroad. The most coming from the North East, South East, Mid West, North West, and the United Kingdom. Though the condition of the animal which the foot came from was not known, foot quality was evaluated with a score being assigned to each. The scoring system used was based on a scale of 1 through 10, with 1 being the poorest and 10 being the healthiest. Measurements were also taken. The length of the caudal (back) aspect of the foot was taken, measuring from the widest part of the frog to the widest part of the foot. The widest part of the foot was defined by measuring from the junction of the sole to white line at each point medial and lateral to the center line.

The location of the black hole was recorded, and the hoof capsules were then removed from their dermal layer. The more we preformed this procedure, the more we realized that this defect was showing up with greater frequency. Taking the number of cadavers we had observed, it became apparent that nearly 10 to 12 percent of the hooves worked on had evidence of the black hole seedy toe.

In live horses that I have examined showing this deformity, there was a higher incidence of increased sensitivity to the hoof test in this area. A number of these same horses also showed low grade lameness, often labeled as “undetermined.”

The black hole was just the tip of the iceberg, (to be more correct, the base of the iceberg). Hoof capsule removal on cadavers revealed that the black hole was actually the core base of what appeared to be a growth on the inner wall. This growth appeared to be very dense horn. This growth always took conical shape of varying size. The location of its base is always to the solar aspect of the foot, terminating at the junction of the sole to white line. The proximal end of this conical shape was always proximal to the distal border of the dermal layer and coffin bone. In some cases, it appeared that this excess growth was originating at the coronary band, with its size increasing from proximal to distal. In all cases observed, the distal border of the coffin bone and its corium modeled to accommodate the excess horn. No evidence of this increase was presented on the outer hoof wall.

There are many theories about what may cause the notch, labeled “creana” at the distal tip of the coffin bone. Some stating that high heels or toe clips may be to blame. It

was these theories that led me to the question: what developed first, the notch or the excess dense horn? If the notch developed first, it could be concluded that the dermal layer, sensing the increasing gap between itself and the epidermal layer, simply goes into overdrive and produces horn to fill the void. I find that unlikely.

I present another possibility, one that is far easier to support. With the understanding that pressure is the stimulus for growth; it is possible that pressure and stress caused an increase of horn production. This increase in horn would cause the coffin bone to model around the ever increasing conical mass. My first thought was that these conical growths were some form of keratomas. With close inspection, some specimens did seem to show evidence of having their origins at the coronary band. This evidence supported the hypothesis that they were keratomas.

Acting on this hypothesis, I firsted asked Alun Jones, MRCVS of Wales, to biopsy the growths for study. More recently we have had a large sampling of specimen biopsies completed, with the help of Lisa Markowitz, Ph.D. The difficulty is that there is so little published on the histology of the keratoma. The keratoma is described as being a hoof wall tumor. The growths we're studying were extremely dense, leading to the assumption that they may well be keratomas, though cell structure was not consistent with a tumor. With return of the evidence the biopsy provided, it appears that we are not dealing with a keratoma, but a dense formation of hyper-keratinized horn. It has been suggested that HKH is produced in response to stress.

Proceeding under the premise that we were dealing with a hyper-keratinized horn (HKH) growth and not a keratoma, We began to accumulate information about the growths that may help to define this deformity.

- The size of the growth appeared to be in proportion to the health of the foot.
- Weak caudal structure to the foot always seemed to accompany the HKH growth.
- The foot afflicted with long toe / low heel syndrome showed a higher incidence of HKH growths.
- There is growing evidence that the shod horse is more likely to develop HKH growths than the unshod horse. I will hypothesize that this may be due to the increased ability the unshod foot has to maintain balance.
- The club foot showed a higher incidence of growths.

I would not go so far as to suggest that toe clips were a leading cause of HKH growths. This notion can easily be dispelled having found evidence that the incidence of notching of the coffin bone exists in feral horses and young stock that have not worn shoes.

Further histological studies will continue. The results of which when coupled with radiographic findings in the live horse could help us to better understand HKH growths, and their impact on the health of the horse. The information collected to date and future findings should allow us to develop a treatment protocol should HKH growths prove to be a base line cause of lameness in the horse.

Studies have allowed me to define a rather accurate means by which to determine the extent of growth of the HKH, and whether or not the growth may be a cause for lameness. To date, 220 hoof capsules have been removed from hooves showing evidence of HKH growth. This has allowed for the cataloging of variances in the sole and white line that each presented; utilizing this information allows for accurately determining the scope of the growth.

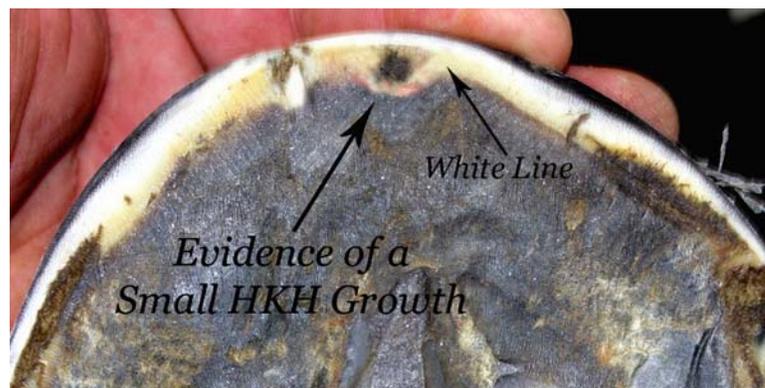
The physical appearance of a small black dot is no reason for alarm, and does not warrant radiographs, in my opinion. Seedy Toe can be present and show no evidence of HKH growth. This has occurred on many occasions, though it is quite possible that HKH growth was present to a very small degree.

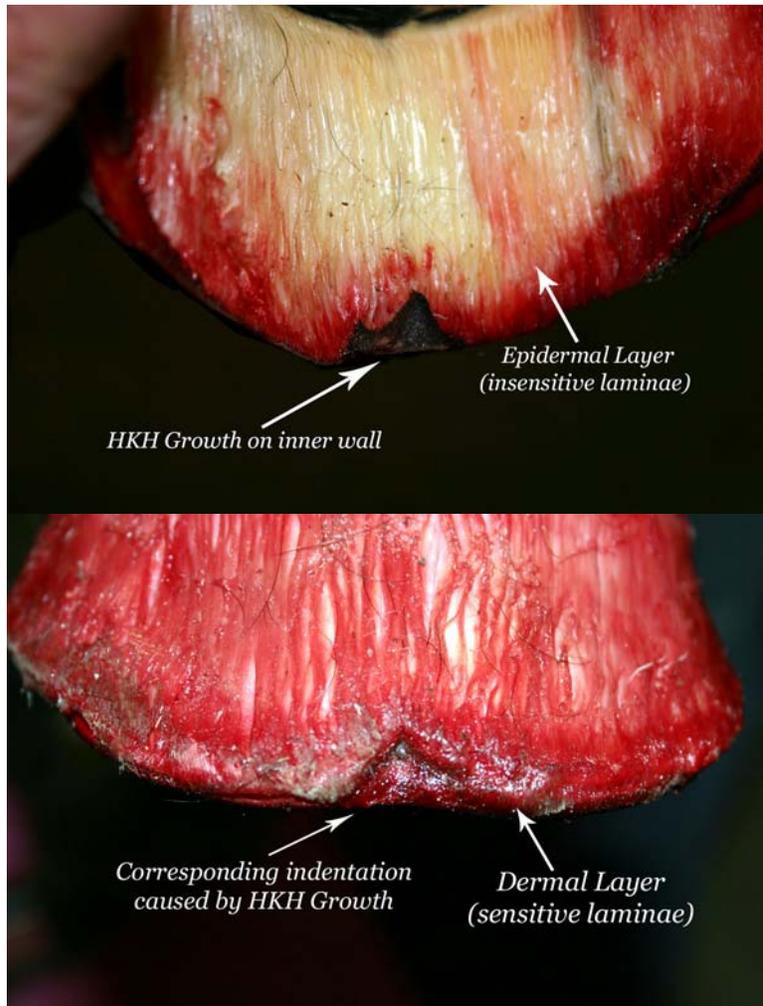
A sizeable black hole (exceeding 6 mm in diameter) will often present a conical shaped rise in the sole. The conical shape will have its base originating at the junction of the white line and sole. This conical rise will run palmar to a point that is directly distal (below) to the notch in the coffin bone. The white line junction to the sole must also show deformation, with this being a semi-circular deviation that terminates the conical rise in the sole. This deviation will almost always be semi-circular, as the HKH growth lies dorsal to the white line.

What should we do if we do suspect that our horse has an HKH growth? Our actions should depend on the state of our horse, and the condition of its hooves, in general. If your horse is indeed showing occasional lameness, or you consider your horse footy at times, then x-rays may be called for, if evidence of an HKH is present. Be certain to tell your veterinarian what you suspect; this will guide them in taking the correct x-ray views.

The HKH growth appears to be progressive and may eventually be categorized as degenerative in nature. If x-rays return the verdict that a possible HKH growth exists, then you must make every effort to maintain balance in the affected foot. We have found that maintaining balance and relieving known causes of stress, i.e. long toes, flare, high toe, under run heels and so on, will help to slow or stop the progression of the HKH growth. Until further research is completed, actual treatments for the HKH growth can not be defined. Unlike the keratoma that can be surgically removed, the HKH growth is not likely to be a candidate for surgical removal. The reason for this is somewhat obvious; if stress is the cause of the growth, and the stress is not eliminated following surgical removal, then a return of the HKH growth is likely. It is also likely that the growth is being produced by the dermal layer responsible for white line or sole production and removal of the growth would also require removal of the dermal layer.

I suggest that if you think your horse has an HKH growth that you Clean Trax the area to reduce the incidence of infection, have a balanced trim applied removing any obvious causes of stress, and begin a rehabilitation routine to return any weak structure. This can be achieved with the introduction of a carefully planned hoof care program and a responsible exercise routine.





This photograph was sent to us by Carola Adolf of Australia. It shows the epidermal layer, but is a good example of an HKH growth and resulting deformation of P3