Reading between the Lines: White Line Disease

What is it?

White line disease (WLD), is a multifactorial process that leads to a progressive separation of the inner zone of the hoof wall. The white line of the hoof can be visualized on the sole, and is the junction of the insensitive laminae of the hoof wall and the horn of the sole. The hoof wall consists of three layers: the stratum externum (external layer), stratum medium (middle layer), and stratum internum (inner layer). In WLD, the hoof wall separates from the underlying laminae (stratum internum) at the level of the stratum medium, also known as the tubular horn. When we use the term "white line disease", we are referring to the fact that the horse has some degree of separation of the hoof wall from its laminar attachments. Typically, the condition begins with a crack or opening within the white line, which then allows bacteria or fungus to enter the stratum medium. Since this is closely associated with the laminae, cavities subsequently develop between the laminae and outer hoof wall.

What causes it?

White line disease can affect a horse of any sex, age or breed, barefoot or shod. Mechanical stress, inappropriate farriery, genetic factors, and environmental conditions may all play a role in the development of WLD. Poor hoof hygiene has often been held responsible for the development of WLD, however it remains questionable as the initiating cause. It is believed that the primary event is mechanical stress on the inner hoof wall such as from poor hoof conformation or less than ideal farriery. These include, excessive toe length, poor hoof conformation, and various hoof capsule distortions such as long toe-under run heel, clubfoot, or sheared heels. This stress leads to breakdown of the hoof's natural barrier, and allows invasion of opportunistic bacteria that possess keratinolytic enzymes. These bacteria digest the hoof horn, leading to the progression of the separation proximally towards the coronet band. If left untreated WLD will become extensive and displacement of the distal phalanx can become a sequel.

How do we diagnose it?

Clinical signs for WLD can vary and the degree of lameness present can range from non-existent to severe. Some horses may show a positive reaction to hoof testers while others may not. This is why it is very important to start the diagnostic process with a thorough physical exam and lameness evaluation. As WLD becomes moderate to severe, damage is sufficient to allow mechanical loss of the attachment between the laminae and the inner hoof wall, clinical signs of pain (typically lameness) can be seen. When examining the foot from the solar surface, there is often a visual confirmation of a separation between the hoof wall and underlying laminae. Looking even deeper into the inner hoof wall, the

inner white line will typically show a separation filled with a grey/white powdered horn material. A probe can be used to further explore the depth and extent of the cavitation. Additionally, a hollow sound is typically heard if the outer hoof wall is percussed with a hammer. WLD should be differentiated from other common foot lameness that will block out to a palmar digital block, such as chronic laminitis and foot abscesses. If lameness is present on initial evaluation, a thorough lameness examination should be performed including nerve blocks to confirm the suspected area followed by radiographs. When extensive hoof wall damage is present and subsequently pain, WLD can mimic laminitis both clinically and radiographically, and thus it is important to differentiate between the two.

Figure 1: These two images show WLD present on the dorso-lateral hoof capsule as well as separation from the inner zone of the hoof wall. The affected area extended proximally all the way to the coronet band, and from the lateral quarter to just medial of midline.

Radiographs should be taken to show the extent of separation between the hoof wall as well as to rule out laminitis. A lateral and dorsopalmar view are generally sufficient to allow for accurate interpretation of WLD. In chronic cases of WLD, pedal osteitis has been seen as a sequelae. Radiographs also allow for better visualization of the hoof capsule and can help with trimming and shoeing the horse in the future.

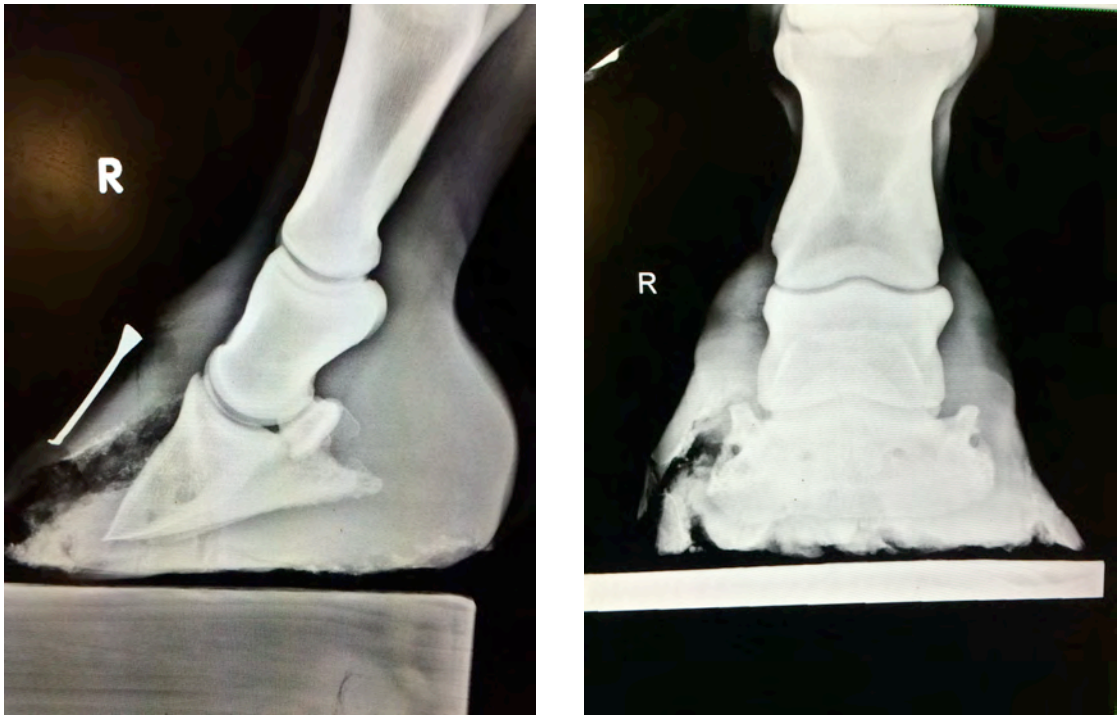

Figure 2: A lateral and dorsopalmar view of the RF foot shows WLD extending towards the coronary band. There is evidence of rotation (~14 degrees) but no evidence of sinking of the third phalanx (coffin bone). The sole depth is thin (~9mm).

How do we treat it?

When treating WLD, corrective trimming is imperative to remove abnormal stresses on the hoof wall, in conjunction with resection and debridement of the entire extent of the separated hoof wall until the firm, healthy adhesion of the hoof wall to the underlying stratum internum can be seen. Resection of the hoof wall is performed using hoof nippers, a hoof knife, and motorized tools.

Figure 3: The above images show the hoof wall resection performed on the right front foot depicted earlier in the article.

Adjunctive shoeing techniques are then applied to provide adequate support to the remaining foot and to remove stress from the affected part of the foot. A heart bar or egg bar shoe redistributes weight-bearing forces to the frog and palmar region of the foot and away from those damaged and therefore weakened areas. Resilient putty is typically used in conjunction with shoe to provide distal phalanx support, especially if displacement of P3 (coffin bone) is a concern. Additionally, it is important that the hoof remains clean and dry. The horse must be kept in a dry stall after treatment, and drying agents (ie. iodine) can be applied to the resected area to prevent excessive moisture from building up. The affected hoof should be cleaned daily with a wire brush. Systemic medical therapy is not required in conjunction with the resection since this disease is limited to the keratinized area of the hoof wall. Plastic acrylic repair may be used as well for prosthetic hoof wall repair, as depicted in Figure 4.

Figure 4: Acrylic hoof wall repair

Prognosis?

Prognosis is dependent on the response to treatment, as well as the effect of the original insult. Horses with poor hoof quality or primary laminitis tend to have reoccurrences of the disease. If initial response to treatment is good and proper environmental conditions exist, then the prognosis is better.

For any other questions associated with white line disease, please feel free to call New England Equine Medical & Surgical Center, or discuss management strategies with your local farrier.

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