REVIEW

Management of the Dorsal Hoof Wall and Its Potential Effects on the Laminitic Hoof

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ABSTRACT

Appropriate management of the equine hoof during chronic laminitis varies by protocol and practitioner. Sequential removal of the dorsal hoof wall was examined in-vivo on a laminitic horse at the walk, revealing an increase in solar force under the margin of the distal phalanx as measured through the use of an in-shoe force measuring system.

Keywords: Horse; Hoof; Laminitis; Dorsal hoof wall; Sole

INTRODUCTION

Chronic laminitis is characterized in part by the displacement of the distal or third phalanx (P3) relative to the hoof capsule, and thus compromises the integrity of the hoof. There are many different ways to manage such laminitic feet. Of the mechanical concepts and considerations often discussed, perhaps the one that is most hotly debated is the ideal location of the breakover point (the last area of the shoe or hoof to oppose rollover of the hoof). Traditionally, the shoe is positioned at the perimeter of the hoof. However, since radiography became a routine procedure for evaluation of the equine foot, it is now widely accepted that the breakover point is more appropriately positioned in relation to P3 rather than to the exterior of the hoof capsule. But what does that mean in the chronically laminitic foot, when P3 is displaced and the internal and external structures of the foot no longer relate with any consistency?

How our trimming and shoeing routines affect the integrity of the hoof capsule as a structural and functional whole also need to be considered. Many of the shoeing strategies currently popular for managing the chronically laminitic foot do emphasize setting the breakover point back from the toe. However, most strategies also involve trimming that invades the hoof capsule at the toe to some extent. Examples of such strategies include rolled-toe, rocker-toe, and square-toe shoes. These shoes are typically set back on the hoof to position the breakover point further back in relation to the toe, and then the dorsal hoof wall is dressed accordingly. But is it wise to remove part of the hoof capsule in such laminitic feet? Would it not further compromise the integrity of this already damaged structure?

The effect of breakover position on the lamellar interface is considered important for managing the laminitic foot, but currently very little attention has been paid to the sole. The sole is contiguous with the hoof wall, and vice versa, so a manipulation that affects the integrity of one may very well affect the forces on the other. In this study, we examined the effect of various manipulations of the dorsal hoof wall in the chronically laminitic foot and how they affected the forces on the sole under the dorsodistal margin (tip) of P3 during locomotion. Our working premise was that it is important to maintain hoof capsule integrity in the chronically laminitic foot.

MATERIALS AND METHODS

The single subject of this study was a horse with chronic laminitis. A preshoeing radiograph showed a difference of 8° between the expected position of P3 and the dorsal surface of the hoof (Fig. 1, top). With the exception noted below, the horse was shod in a manner consistent with a commonly used approach for the laminitic foot. The breakover point was positioned directly under the tip of P3 using a rolled-toe shoe that was glued to the foot, after a two-part silicone impression material was applied to the solar surface of the hoof to support the frog and sole (Fig. 1, bottom).

Trimming and preparation of the foot for shoe placement was routine, except that the hoof wall at the toe was initially left untouched so that force measurements at the sole for three different treatments of the dorsal hoof wall could be compared in the following order:

1. The dorsal hoof wall was left untrimmed and allowed to extend over the front of the shoe (Fig. 2, left).
2. The dorsal hoof wall was squared with nippers across the toe, in level with the front of the shoe (Fig. 2, middle).
3. The dorsal hoof wall was rasped from the coronet to the shoe such that the surface of the dorsal hoof wall was parallel with the dorsal surface of P3; in the process, more depth of wall was removed distally than proximally (Fig. 2, right).

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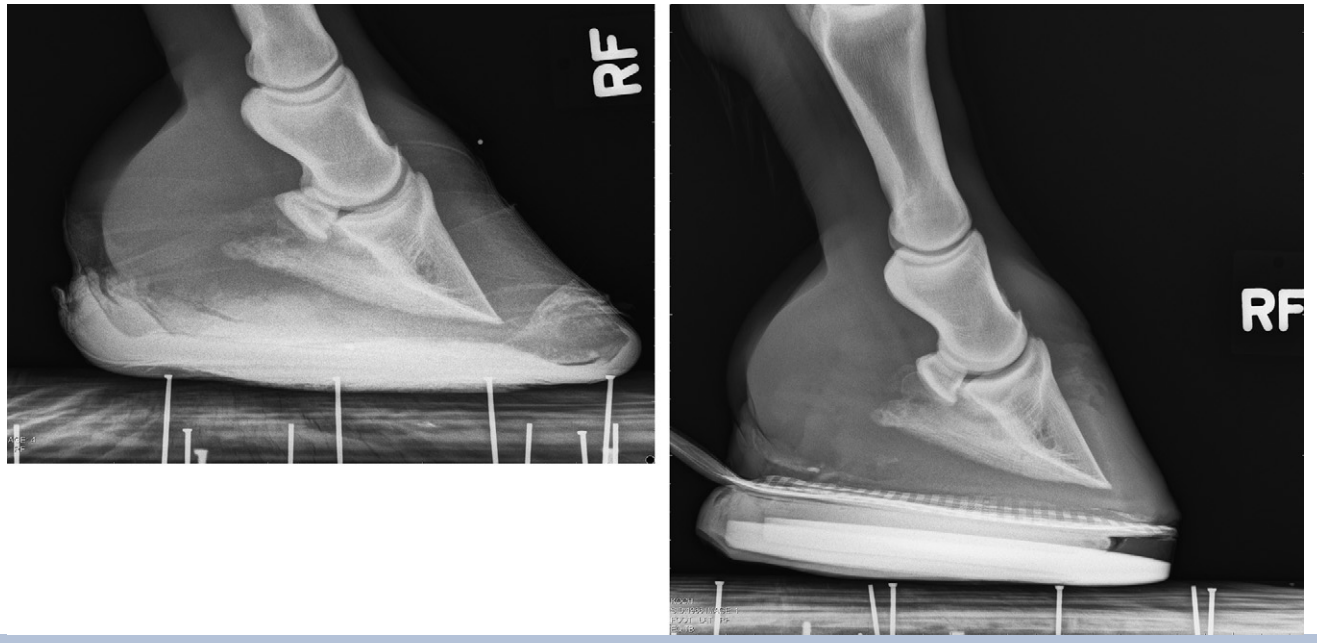

Figure 1. Lateral radiographs of the foot before (top) and after (bottom) trimming and shoeing. The "after" radiograph was taken at the conclusion of the study, after the third treatment of the hoof wall (see Fig. 2, right panel). The striated membrane used for the force measurements can be seen between the hoof and the impression material and extending back behind the heels.

Figure 2. Lateral radiograph of the foot before trimming and shoeing, depicting the three hoof wall treatments evaluated in this study. Left: the dorsal hoof wall was not dressed and instead left to extend over the front of the shoe (the position of which is depicted by the solid black line). Middle: the dorsal hoof wall was squared across the toe with nippers, as depicted by the dotted red line. Right: the dorsal hoof wall was rasped from coronet to shoe, to render the wall parallel with the dorsal surface of P3, as depicted by the dashed red line.

In-shoe force measurements and hoof balance of force on the solar surface of the foot were made using the in-shoe equipment and procedures described elsewhere in these proceedings. For this study, the area of interest was the portion of the sole forward of the frog and bordered by the white line. The horse walked comfortably once shod, so data were collected both at rest and at the walk. Mean and peak force measurements at the walk, as well as percentage of total force (i.e., how much of the total force on the solar surface of the foot was experienced by the area of interest), were averaged over four completed strides.