



Case Report

Clinical Outcome of 14 Obese, Laminitic Horses Managed with the Same Rehabilitation Protocol[☆]



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ABSTRACT

A specific method of rehabilitation was used to manage obese horses with laminitis, and clinical outcome was evaluated after 5 to 20 months. Clinical data from 14 similar laminitis cases were statistically analyzed to evaluate response to rehabilitation. Data were analyzed using repeated measures or logistic regression methodologies. Each horse presented as obese and laminitic with no history of a systemic inflammatory disease. The rehabilitation method emphasized a mineral-balanced, low nonstructural carbohydrate diet; daily exercise; hoof trimming that minimized hoof wall loading; and sole protection in the form of rubber hoof boots and/or hoof casts. Distal phalanx alignment within the hoof capsule was significantly improved, and hoof wall thickness was significantly decreased ($P < .0001$) following treatment. Solar depth was significantly increased ($P < .0015$). Reduction of palmar angle measurements was detected in acutely and chronically affected horses. This treatment effect was statistically greater for horses with chronic laminitis than for horses with acute laminitis (P interaction $< .0001$). Horses were 5.5 times more likely to be sound post-treatment than before treatment. Daily exercise, dietary modification, and removal of ground reaction force from the hoof wall were foci of the rehabilitation program. Hoof care and husbandry as applied to these horses may be an effective method of rehabilitation of horses from obesity-associated laminitis.

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1. Introduction

It is generally accepted that prognosis for laminitic horses with significant palmar rotation of the distal phalanx is guarded to poor [1]. Other indicators predicting outcome of laminitic horses include severity of lameness [2], white blood cell count [3], weight of the horse [4], number of feet

involved [5], and the magnitude of the corrected (for magnification) distance between the proximal aspect of the extensor process of the third phalanx and the most proximal extent of the proximodorsal wall measured on a lateromedial radiograph [6]. The inciting cause of laminitis may also be a factor in outcome. Recent studies indicate that the basement membrane of epidermal laminae of ponies with insulin-induced laminitis remains intact [7] and minimal upregulation of matrix metalloproteases occurs in the laminae when laminitis is insulin induced [8]. Preservation of the basement membrane in these laminitic ponies suggests that some horses with endocrinopathic laminitis

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may have complete or at least improved hoof repair once the ongoing insulin-induced laminar insult is eliminated.

Results of studies indicate that exercise and controlled feed intake decrease insulin resistance in ponies [9–11]. However, exercising laminitic horses is controversial when movement causes pain and/or may further damage inflamed lamina.

The goal of this study was to evaluate the outcome of laminitic horses subjected to a specific management program that emphasized a mineral-balanced, low nonstructural carbohydrate diet; daily exercise; hoof trimming that minimized hoof wall loading and re-established a lower palmar angle; and sole protection in the form of rubber hoof boots and/or hoof casts (see sections 2.3 to 2.7 below) when needed for horse comfort and safety. This program was expected to improve foot morphology, radiographic parameters, and gait. The medical records of 14 obese, laminitic horses that participated in the management program were examined, and objective parameters were statistically analyzed.

2. Materials and Methods

2.1. Case Selection

The medical records of 14, obese (body condition score >6), laminitic horses that had acutely or insidiously developed bilateral forelimb (13 horses) or bilateral forelimb and hindlimb (1 horse) lameness with clinical and radiographic signs of laminitis were evaluated. A horse's medical record was included for evaluation if the horse had a history of each of the following: development of laminitis while on grass pasture, a presenting Obel lameness score ≥ 2 [12] (subjectively determined by D.R.T.), radiographic evidence of palmar rotation of the distal phalanx or proximal rotation of the hoof capsule of both forelimbs, a presenting body condition score >6, and management with the protocol described below. Horses that had either divergent growth rings of the hoof capsule or remodelling of the distal phalanx, or both, were classified as having “chronic” laminitis, and those who lacked divergent growth rings of the hoof capsule and had no evidence of remodelling of the distal phalanx at the time of presentation were considered to have acute laminitis. “Lipping” of the distal phalanx on the lateral radiograph was considered evidence of remodelling. Growth rings that were wider in the heel region than in the toe region were considered divergent. Statistical analysis was performed using clinical data at 2 time points: initial presentation and when the client requested the final radiographic re-evaluation and the horse had returned to its previous level of soundness (5–12 months postinitial presentation).

2.2. Radiographs and Measurements

All lateromedial radiographs of the front feet were acquired by the same clinician (D.R.T.) [13], using criteria described by Redden [14,15], and included the following recommended standards: a true lateral projection with the primary beam striking the foot in a horizontal plane 1 cm above the bearing surface; a zero subject-to-film distance

by ensuring that the medial aspect of the hoof was in contact with the radiographic cassette and maintaining a consistent distance between the radiograph machine and the cassette; detailing the face of the hoof wall with barium; and having the horse standing on 2 wire-embedded positioning blocks of equal height, with the limbs in a vertical position. The proximal aspect of the hoof capsule and dorsal margin of the hoof capsule in all cases had been marked with barium paste to bisect the foot from the roots of the most distal hairs of the coronary band to the tip of the hoof capsule at the bearing surface. The sagittal plane of the sole of the hoof was marked with barium on some horses.

Five radiographic parameters were measured and recorded for statistical analysis (Fig. 1A, B): (1) The thicknesses of the dorsal horn and lamellar tissues were measured proximally at the level of the base of the extensor process and distally at the level of the tip of the distal

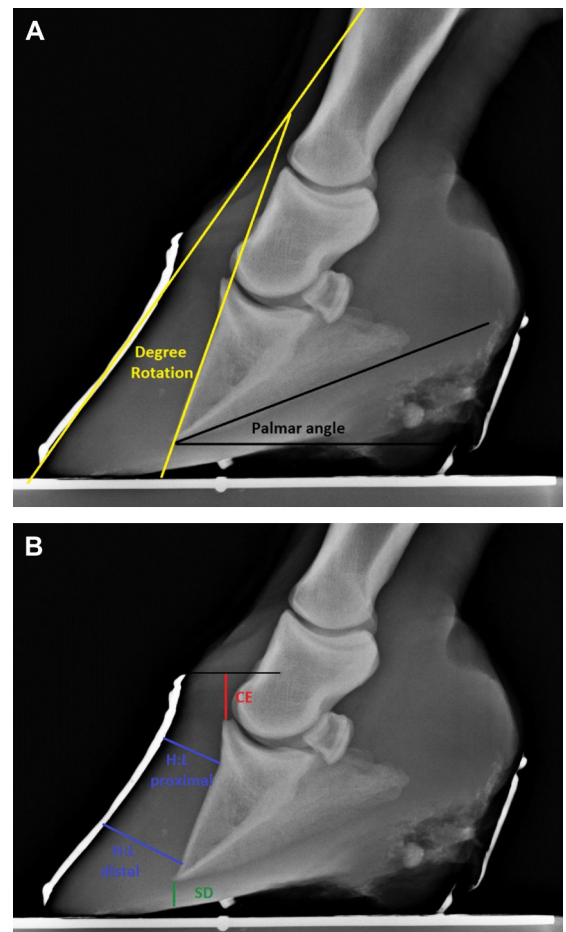


Fig. 1. (A) Method used to measure the degree of rotation (yellow angle) and the palmar angle (black angle), which were evaluated before and after treatment on both front feet of each horse. (B) The red line shows the measurement of the horizontal distance from the coronary band to the extensor process (CE); the green line shows sole depth measurement (SD), and the blue lines show measurement locations of the thickness of the proximal and distal aspects of the dorsal hoof wall (H:L zones). Each of these measurements was evaluated before and after treatment on both front feet of each horse.

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