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## MANAGEMENT OF CHRONIC AND COMPLICATED CASES OF LAMINITIS IN HORSES

(With 10 Figures)

By

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علاج الإلتهاب المزمن والحالات المركبة للصفائح الحساسة في الخيول

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أصيب ٢٠ حصان عربي (٨ إناث و١٢ ذكر) بالإلتهاب مزمن في الصفائح الحساسة للقوائم الأمامية. وشوهد بها أن بطن الحافر إما مفرطح أو هابط في ١٢ حيوان أو منفجر في ٨ حالات مع درجات مختلفة من التفاف أو هبوط عظمة الحافر (السلامية الثالثة) ولوحظ أن مكان الانفجار كان أمام نسر الحافر. وتم التعامل مع هذه الحالات بالعلاج الدوائي والعناية بالحافر وشمل مضادات الإلتهاب وموسعات الأوعية الدموية مع استخدام علائق مضاف إليها خليط من البيوتين والزنك. وتم تقليم وتهذيب الحافر ونعل الحافر ووضع بعض العقاقير وكذلك استخدام حدوة معينة إما مفتوحة بعمود عند الكعب أو مغلقة تماما من أسفل. وكل الحالات استجابت بدرجة جيدة لهذه الطريقة ماعدا حالتين كان بهما تغيرات مزمنة واضحة وضمور في الحوافر.

### SUMMARY

Twenty Arabian horses (8 mares and 12 stallions) were found suffering from chronic laminitis in the fore feet. They showed closed sole either flat or dropped (12) and ruptured soles (8) with different degrees of rotation and sinking of pedal bone, whereas the rupture seat was usually in front of the apex of the frog. Management comprised therapeutic treatment and hoof care. The first included anti-inflammatory and vasodilator drugs together with the use of ration supplemented with biotin-zinc mixture. Hoof care was in the form of skillful trimming and paring of the solar aspect, after application of some medicaments a special shoe with transverse bar (in case of closed sole) or complete metal soles (in case of ruptured soles). All cases responded well to this management with exception of two animals that had marked chronic changes and contracted hooves.

**Key words:** Laminitis, Horses.

## INTRODUCTION

Laminitis is a disease associated with ischaemia of the submural structures of the foot (Hood, 1999). If treatment of the acute stage does not lead to full recovery, the disease will progress to the point where there is clinical and radiographic evidence of displacement of the pedal bone. Initially during the prodromal phase of laminitis, the laminae stretch resulting in sagging down of the distal phalanx within the hoof (Eustace and Cripps 1999). The bond between the dermal and epidermal laminae (the inter-laminar bond) is the only means of support of the distal phalanx within the hoof. If the laminar insult is severe enough or the animal is forced to walk, interlaminar bonds will break and cause further downward movement of the distal phalanx. If sufficient inter-laminar bonds are destroyed the animal becomes foundered i.e.; the pedal bone moves distally within the hoof. A sinker is an animal whose foot has suffered complete destruction of the inter-laminar bonding and the pedal bone is totally loose within the hoof (Eustace, 1990, Alford *et al.*, 2001). A sagittal section of the digit of a foundered horse shows that the coronary corium has become squeezed between the top of the hoof wall and the front of the distal interphalangeal joint and extensor tendon. Unless the dorso-proximal hoof wall is thinned, or a groove drilled below the coronary groove, to relieve the compression on the coronary corium the blood supply cannot re-establish and create new wall horn. This is why untreated foundered feet have divergent growth rings with less horn formation at the toe than the heels (Cripps and Eustace, 1999). However, individuals with chronic laminitis show variable peculiarities that vary from one another. Therefore, there has been no particular line of treatment that could be recommended constantly for all cases. This study aims to provide a practical clinical trial for management of chronic and/or complicated cases of laminitis including a therapeutic regimen and hoof care so as to provide some practical advice on treatment.

## MATERIAL and METHODS

The material used in the present study comprised twenty Arabian horses 5 to 8 years old (average 7.3 years) suffering from chronic laminitis affecting the fore feet. Twelve of them had intact solar aspect and the rest had perforated soles. Cases whose sole aspect was intact, received hoof care including shoe removal, cleaning of the sole, careful trimming of the horny material at the toe -depending on x-ray findings- to be parallel to the dorsum of the third phalanx (Figs. 1 & 2), hoof



silicon was applied prior to fixation of a special shoe with transverse bar for three months (Fig. 3). The dorso-proximal hoof wall was thinned, or a groove was drilled below the coronary band. The trimming of the toe and the change of the shoe were practiced monthly during this period. An ordinary shoe was then applied till complete recovery (Figs. 4 & 5). Those animals were shifted to a ration rich in biotin zinc mixture<sup>1</sup> at rate of 15 mg/day and methionine in the grain feed at the rate of 20 gm /head till complete recovery. Phenylbutazone<sup>2</sup> tablets were given at a dose rate of 4.4 mg/kg b wt for one week followed by 3.3 mg/kg b wt two weeks then 2.2 mg/kg b wt for two weeks and lastly 1.1 mg/kg b wt for seven weeks. Oral Isoxsuprine<sup>3</sup> tablets at a dose rate of 1.2-mg/kg b wt were given for three months. These animals carried on their daily practice twice a day for one hour on hard ground.

In case of ruptured sole (Fig. 6), the same medications plus Penicillin steryptomycin<sup>4</sup> were given intramuscularly for one week. A special skillful hoof care included trimming and paring of the horny solar aspect putting in consideration not to leave any loose horny material even if most of the horn was removed, followed by application of warm antiseptic footbath using magnesium sulphate once or twice a day for one week till it became apparently clean. Then the whole solar surface was touched with concentrated tincture of iodine (10 %) followed by application of grained iodine crystals plus equal parts of tannic acid, sulphur and copper sulphate. After application of medical tar<sup>5</sup>, the hoof sole was covered with cotton wrapped in a piece of gauze that was kept in situ using special shoe with complete metal sole (Figs. 7 & 8). The dorso-proximal hoof wall was thinned, or a groove was drilled below the coronary band. Moreover, the toe was shortened and trimmed. After complete recovery (Fig. 9) and hardening of the sole, the shoe was changed to an ordinary one, which was changed monthly. Animals either with intact or perforated sole were kept on soft floor (shipped wood) or enough sandy bedding. Daily clinical examination was routinely carried out for evaluation of the line of treatment regarding the gait, behavior, attitude, and status of the affected hoof.

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<sup>1</sup> Biotin 2000, L.P.C.

<sup>2</sup> Phenylbutazone, Phoenix

<sup>3</sup> Sshire Richwood

<sup>4</sup> Combi Kel 20 + 20, Kela laboratoria

<sup>5</sup> Stockholm tar, Rappide B.V. Haaksberge

## RESULTS

All horses suffered from chronic laminitis with either closed or ruptured sole responded well to the management trial with exception of two animals that had marked chronic changes and contracted hooves. These Arabian horses were 5 to 8 years old (average 7.3 years) and included 8 mares and 12 stallions. The present results showed that the degree of lameness was in close relation with the intense of chronic pathological changes of the disease. The more severe, pronounced rotation of the pedal bone, the more severe, and there were marked degree of lameness. The horse moved with the forefeet in front of its body bearing weight on its heels. The affected hooves were elongated with divergent growth rings with less horn formation at the toe than the heels all around. Eight of the affected animals showed intact flat sole.

The used hoof care protocol in cases whose sole aspect was intact, gave good results. The application of hoof silicon prior to fixation of a special shoe with transverse bar prevented more sinking of the pedal bone. Daily practice twice a day for one hour on hard ground seemed to offer help in this respect. In the meantime, shifting to a ration rich in biotin zinc mixture and methionine improved hoof growth quantitatively and qualitatively. Moreover, phenylbutazone minimized the pain.

In case of ruptured sole, the used medications for one week gave good results. A special skillful hoof care resulted in production of healthy newly formed horn that was hard and dry. Daily clinical examination revealed gradual improvement in the gait, behavior, attitude, and status of the affected hoof then became completely normal. Radiological examination showed that the pedal bone returned to its normal position (Fig 10).

In the rest of horses (12) at which the disease persisted for ten days or more, they had punctured dropped soles with varying degree of rotation and sinking of the pedal bone (Fig. 2). The perforation site was opposite to the apex of the frog (Figs. 6, 7). In these cases there was markable swelling at the coronet that subsided soon after sole rupture, by that time they showed severe degree of lameness. Three days later the wound showed well-established infection. In cases where hoof sloughing started from the coronet, and not perforated it should be opened at the solar aspect opposite to the separation site otherwise complete hoof sloughing would take place. Cases that started three weeks ago, showed rotation and sinking of the pedal bone (Fig. 3) and the rotation in one



bone was clearer than the other. In the meantime, cutting of the toe was parallel to the surface of the third phalange as it appeared in radiography.

### DISCUSSION

Regarding the used material in the present study, 60% of the randomly collected studied cases were stallions and their mean of age was 7.3 years. However, Garner (1980) and Slater et al (1995) in their epidemiological study of equine laminitis at Texas found that horses with chronic laminitis were significantly older than those with acute cases (mean 10 years) and females than males. Polzer *et al.* (1996) found that there was no association between laminitis and sex, breed, age and seasonality, meanwhile, such association was found clear for age (Alford *et al.*, 2001) and the last quarter of the year and not clear regarding breed or sex. Slater et al (1995) reached to results that contradicted with the aforementioned one. Other studies suggested that both sexes were at equal risk (Stashak, 1996). This contradiction might show that the risk-relation between both sex and age and the chronicity of the disease remained undefined. In the meantime, the low incidence of chronic laminitis in mares in the present study could reflect that owners, because of the high-cost treatment, choose to treat animals on the basis of its future usefulness. Moreover, the use of stallions for oriental dancing is considered a stress factor that might result in higher incidence of the medicine. However, Stashak (1996) to overcome this dispute suggested that females were at higher risk between 4 and 7 years of age, whereas males were at higher risk between 7 and 10 years. This opinion might explain why most of the presented cases of a median age of 7.3 years were stallions.

The results showed also that many neglected animals survive an episode of acute founder were left with the distorted feet of chronic founder. The importance of recognizing and differentiating between cases of laminitis, acute founder, sinker syndrome, chronic founders cannot be over-emphasized as each carries a very different prognosis (Eustace 1992; Eustace and Cripps, 1999). The authors presented this treatment trial as a fruit to their numerous previous trials.

Radiography of both feet was mandatory as it demonstrates the degree of rotation of pedal bones (Fig. 4). The present results revealed that the rotation in one bone was clearer than the other, it could be because the rotation in one bone preceded the other (Cripps and Eustace, 1999). Moreover, Eustace (1990) advised practitioners not to ask farriers to fit heart bar shoes without taking radiographs using markers. He also

advised them not to consider that the movement of the distal phalanx resulting in solar prolapse is the end of the horse's working life, but the occurred amount of distal displacement was the important point. It is worthy to mention that the presented work reached to the same conclusion.

In the meantime, Radiograph was of great aid so cutting of the toe was parallel to the surface of the third phalanx as it appeared in radiography. Such correction minimized the pressure exerted over the bone thus aided its correction.

The medicaments utilized in the present regimen aimed to induce a synergistic effect to cover all the requirements of that stage. So as cases whose sole aspect was either intact or prolapsed received phenylbutazone for twelve weeks at different dosing. Such drug was known to relieve pain associated with chronic laminitis as it decreases inflammation and edema (Baxter, 1996 and Strickland, 1997). However, chronic pain is more likely difficult to be assessed than acute pain. Such pain is viewed in terms of distress, discomfort, or frank suffering. Moreover, those animals were shifted to a ration rich in biotin zinc mixture and methionine so as to encourage horn production and improve hoof growth quantitatively and qualitatively (Nyack *et al.*, 1982 and Buffa *et al.*, 1992). Isoxsuprine as rheologic agent was included in the regimen so as to enhance digital vascular perfusion (Kofler, 1999).

Toe trimming and corrective shoeing in Cases whose sole aspect was intact, gave good results through minimizing the physical tearing of compromised laminae along the dorsal aspect of the hoof wall. The application of hoof silicon prior to fixation of a special shoe with transverse bar together with daily practice twice a day for one hour on hard ground prevented mechanically more sinking of the pedal bone. Keeping foundered horses on good pedding seemed to minimize concussion to the foot.

In cases where hoof sloughing started from the coronet, and not perforated it should be opened at the solar aspect opposite to the separation site otherwise complete hoof sloughing would take place. Cases that started three weeks ago, showed rotation and sinking of the pedal bone. The rotation in one limb was clearer than the other. In the meantime, cutting of the toe was parallel to the surface of the third phalanx as it appeared in radiography.

In cases of ruptured sole, a special skillful hoof care included the application of warm antiseptic footbath using magnesium sulphate plus parental administration of Penicillin streptomycin controlled infection

both locally and systemically. Touching the whole solar surface with concentrated tincture of iodine (10 %) followed by application of iodine crystals plus equal parts of tannic acid, sulphur and copper sulphate powder induced a better drying effect and horn hardening. On the other hand, others did prefer this so as to avoid the cushioning effect of copper sulphate, iodine and water on the pedal bone (Chapman and Platt, 1984). Moreover, in the present study, the use of special shoe with complete metal sole in case of solar prolapse gave good results. Such shoe should not touch the sole or bars of the foot otherwise it would hinder the blood supply of that area (Chapman and Platt, 1984). However, Stick *et al.* (1982) did not prefer fitting any shoe other than a correctly fitted heart bar shoe to foundered horses. They added that the animal has foundered; the bone is loose within the hoof and the higher you raise it from the ground by means of non-support shoes, the further the bone has to move downwards. However, Eustace (1990) recommended avoiding fitting any device that applies pressure to the unprolapsed sole of the foot, as it is not designed as a weight bearing structure and will easily bruise and abscess.

In the present work, it was noted that if the horse was forced to walk, interlamellar bonds, only means of support of the distal phalanx, will break and cause its further downward movement. If sufficient interlamellar bonds were destroyed the animal becomes foundered. (Eustace, 1990 and Alford *et al.*, 2001). Unless the dorso-proximal hoof wall is thinned, or a groove drilled below the coronary groove, to relieve the compression on the coronary corium the blood supply cannot re-establish and create new wall horn.

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### LEGEND OF FIGURES

- Fig. (1): Planning of the horny material of the toes.  
Fig. (2): Lateral radiograph of the digit showing displacement of the third phalanx.  
Fig. (3): Bar shoe applied after silicon at the sole.  
Fig. (4): Right fore hoof after complete normalization, left one before final trimming.  
Fig. (5): Lateral radiograph of a normalized hoof with an ordinary shoe.  
Fig. (6): Lateral radiograph showing high degree of rotation of the third phalanx.  
Fig. (7): Solar aspect of the hoof with perforation showing a crescent of third phalanx.  
Fig. (8): A special shoe with complete metal sole.  
Fig. (9): Hooves with chronic laminitis after recovery.  
Fig. (10): Lateral radiograph after complete recovery, the pedal bone return to normal position.

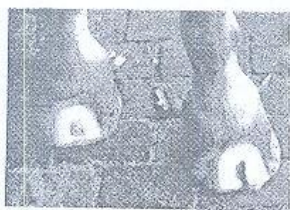


Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

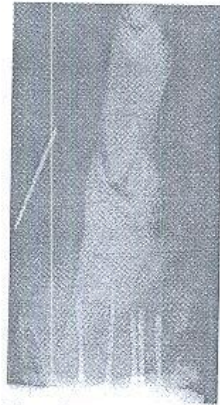


Fig. 6

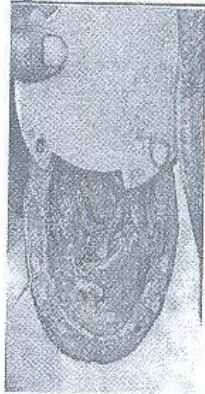


Fig. 7



Fig. 8



Fig. 9



Fig. 10