Proceedings of the American Association of Equine Practitioners

Focus Meeting on the Foot
Fort Collins, CO, USA – Sep. 5-7, 2013

Next Meeting:

Annual Convention
Dec. 7-11, 2013 - Nashville, TN, USA

Resort Symposium
Feb. 6-8, 2014 - Rio Grande, Puerto Rico, USA

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A Practical Approach to Managing Acute Laminitis

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I. INTRODUCTION

Severe acute laminitis should be considered a medical emergency as there appears to be a limited time frame for medical intervention. Laminitis is far more difficult to treat than other soft tissue injuries due to the fact that the affected tissue is located within a very rigid structure, the hoof; the tissue accepts tremendous load, is subject to mechanical forces and the circulation to the lamellae can be readily compromised. The challenges faced by the veterinarian are enormous and include not only treating a disease in which the etiology is poorly understood but also guiding and counseling the owner/trainer throughout the treatment process. The owner should be made aware of the difficulties associated with treating severe laminitis and the ethical considerations regarding the welfare of the horse. The goal of the clinician is to relieve pain, attempt to prevent or limit further damage to the lamellae and improve function of the feet. The clinician is often limited in this respect, as it is the extent of the lamellar pathology that will limit the success of treatment and not the treatment regimen itself. Treatment is further complicated because there is no proven or consistently effective treatment for laminitis; consequently treatment regimens for both acute and chronic laminitis generally remain empiric and are based on the past experience of the attending clinician. Each horse with acute laminitis should be approached on an individual basis taking into consideration the history, the predisposing cause, the amount of pain (instability), the foot conformation and the structures of the foot that can be used to change the forces placed on the lamellae.

Most cases of acute laminitis will be treated at the client’s farm and not sent to a referral facility as the sheer act of moving a horse with acute unstable laminitis may worsen the existing condition. Initially, the necessary expertise, medical care, imaging and farriery care can be provided at the farm on an ambulatory basis. Radiography is essential to confirm the diagnosis, assessment of foot conformation and guide for the initial hoof care. Additional benefits of treating the horse as an ambulatory patient on the farm are the familiarity of the owner/trainer with the patient being able to assess improvement or deterioration of the condition as they are more aware of the animal’s normal behavior than the attending veterinarian. An acceptable outcome in all but the mildest cases of laminitis requires a team of dedicated individuals consisting of the veterinarian, farrier and horse owner. This paper will present an overview of the treatment options available for acute laminitis in an ambulatory setting.

II. THE PHASES OF LAMINITIS

The classification of laminitis into phases is both a convenience to enhance comprehension and assist in the diagnosis, treatment and prognosis but the disease is often a continuum. Laminitis is divided into the developmental, acute, and chronic phases, all three phases of which are relevant to the treating clinician. The developmental stage of laminitis is the initial phase of the disease that begins with the original insult to the lamellae and ends with the onset of clinical symptoms such as acute lameness, increased digital pulse, heat in the feet, hoof tester pain and a laminitic stance. The acute stage begins with the onset of clinical symptoms and is frequently cited as lasting 72 hours or until displacement of the distal phalanx within the hoof capsule occurs, whichever is sooner. Chronic laminitis has been associated with continuation of clinical signs and / or a change in position of the distal phalanx within the hoof capsule; however, if the clinical signs of acute laminitis have not markedly improved within 48-72 hours, the author considers the horse to be entering the chronic stage.

III. THE MECHANISM

The anatomic structure of the tissues affected by laminitis has been well documented. However, despite considerable recent advances in our understating of the pathophysiology of laminitis, there is still much to be learnt about the initiating events and the pathways by which they lead to the acute symptoms. The interdigitating dermal and epidermal lamellae and their related vasculature are positioned between the parietal surface of the distal phalanx and the rigid hoof capsule. The digital circulation to the distal dorsal lamellae is from the branches of the terminal arch that form the circumflex artery and the proximal dorsal lamellae receive its blood supply from the coronary artery. Any compromise or instability in the lamellae changes the position of the distal...
phalanx, which in turn creates abnormal pressure on the vessels restricting circulation. The hoof has a very low compliance which means that only a slight increase in volume following tissue edema results in a marked increase in tissue pressure – this scenario could be considered a type of “compartmental syndrome” effect.

IV. ASSEMBLING THE TEAM

The equine practitioner is responsible for the overall health care and welfare of the horse. When confronted with a serious case of acute laminitis, a farrier will generally play a prominent role in the farriery aspect of treatment. The team is completed with the owner/trainer of the animal who will often be the primary care giver, the individual who makes the decisions regarding treatment and the one responsible for the financial obligations associated with the treatment. If either clinician (veterinarian or farrier) is inexperienced treating laminitis, it is prudent to seek advice from or refer the case to an individual who is more experienced and treats this disease on a regular basis. Current history, clinical impressions and images can be transmitted from the farm by the attending veterinarian to a referral center for a consultation if necessary. The owner should be made aware that there are a multitude of methods/products available, all purported to improve the disease yet none are proven or even consistent. Furthermore, there are no controlled studies documenting the efficacy of any one medical or farriery procedure. Techniques change rapidly and for the most part, are empirical. Thus, laminitis treatment remains anecdotal and is based on the stage of the disease, clinical experience of the clinician and the response of the patient. As there is no proven treatment that is superior to another, frequent dialogue is important not only between clinicians (veterinarian and farrier) but also the owner as there will be diverging thoughts, opinions, theories and previous treatment experiences. The preferred approach is to consider the individual case coupled with the radiographs and decide on a treatment strategy based on medical and biomechanical principles. Client communication is one of the most important but least discussed aspects of case management. A policy of open, honest communication that tempers false expectations of success must be used. Owners should be given realistic information from the onset, such as; severe laminitis has a poor prognosis, there are no proven treatments, any treatment can be extensive, expensive and prolonged, and may result in euthanasia.\(^1\)\(^2\) Given the seriousness of acute laminitis, clients will likely look into other sources for information or hope such as, the Internet, horse magazines and support groups regarding the management of their horse. It is imperative that the attending veterinarian is well versed in the common inquiries that will arise and can be able to address them prospectively. Accurately predicting the outcome of horses with laminitis is impossible. This is understandable given the number of variables associated with management of severe laminitis, which includes not only the feet but the overall health of the patient in addition to client constraints. The owner must be warned that if the horse with laminitis is insured, it is their responsibility to inform the insurance company immediately.

V. PRESENTATION

When presented with a case of acute laminitis, three problems are encountered. First; there is no practical means to assess the extent of the laminar damage present and what the residual permanent damage will be when the animal first shows clinical signs of acute laminitis. The damage to the lamellae occurs during the developmental stage of laminitis which precedes the onset of pain and lameness noted in the acute stage. The number of horses that suffer a severe laminic episode that can be treated successfully once the acute clinical signs are observed is also relatively small.\(^3\) Second; there is no practical means to counteract the vertical load (weight) that is placed on the horse’s feet. Stated differently, we have no practical device, product or method that allows us to take the weight off the compromised lamellae. Third; the distractive force placed on the compromised lamellae by the deep digital flexor tendon (DDFT) is also hard to counteract.

VI. ASSESSMENT

History

The importance of the history can’t be over emphasized. Taking a good history is often overlooked by the clinician often eager to treat the horse but well worth the time as valuable information can be obtained. The history should determine whether this is an initial episode, a reoccurrence, or an exacerbation of a continuing episode. It should also include any pre-existing conditions the horse may have, for example, a recent surgery or colic episode, a retained placenta, or a recent change in exercise routine. The environment should be taken into account as well as the season of the year. It has been shown that fructan levels, which are implicated as an instigating factor in certain types of laminitis, in the grass vary with the season and time of day, and during periods of drought or heavy rainfall.\(^4\) Attempting to obtain an etiology from the history is always worthwhile by asking questions such as: Has the horse been diagnosed with any disease processes? What are the current feeding routines of the horse and has anything changed? Have any medications or vaccinations recently been given to the horse? Is the horse on any long term medications? Has there been a history of trauma recently or in the past associated with the laminitis? Has the horse been subjected to a stressful event or been shipped a long distance? These types of questions may give an insight into the cause of the laminitis and how to initiate treatment.

Physical Examination

A complete physical examination and in particular, a detailed evaluation of the feet is mandatory. The physical examination is performed with both the eyes and the hands of the clinician. Increased temperature, pulse and respiratory rates along with observing the horse’s stance and willingness to move can give information as to the degree of pain the horse is experiencing. Observing the horse’s body and head
position when the clinician is lifting a limb from the ground will give an indication as to the degree of discomfort. Assessment of the intensity of the digital pulse, temperature of the feet and the extent of lameness should be made. The coronary band should be assessed for the presence of edema, for depressed areas which indicate distal displacement and palpably tender areas that are associated with a possible abscess or separation of hoof wall. The shape and position of the sole is observed for degree of concavity or protrusion, soft spots, or excessive loss of depth. The size and conformation of the feet are especially important when designing a farriery plan for the horse and for monitoring subtle changes associated with the progression of the disease. Hoof conformation may influence loading patterns and the type of displacement encountered. For example, in the author’s experience, there will generally be the potential for more displacement in an upright or club foot due to the increased load on the dorsal lamellae caused by the preexisting shortening of the deep digital flexor musculotendinous unit and corresponding dorsal center of pressure in the foot. On the other hand, horses with a long toe–low heel conformation generally have thin soles, which limit the use of the sole in counteracting the weight of the horse.

In most instances, observation of the stance and gait provide a strong indication of the presence of laminitis. The characteristic stilted camped-out front legs are believed to redistribute load to the hind limbs. Variations in stance likely occur due to the presence of pain in the rear feet or variations in the location of pain in the front feet. It is not necessary to use local anesthesia in order to diagnose laminitis and should be avoided if possible. The Obel grading system for lameness in laminitis can be used to document the grade of laminitis and to track the progression (Table 1).

<table>
<thead>
<tr>
<th>Obel Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>At rest the horse will alternately lift the feet or shift the weight. Lameness is not evident at the walk, but a short stilted gait is noted at the trot.</td>
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<tr>
<td>11</td>
<td>The horse moves willingly at a walk, but the gait is characteristic of laminitis. A hoof can be lifted off the ground without difficulty.</td>
</tr>
<tr>
<td>III</td>
<td>The horse moves reluctantly and vigorously resists attempts to lift a foot</td>
</tr>
<tr>
<td>IV</td>
<td>The horse must be forced to move and may be recumbent.</td>
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The clinician must determine the reason for and source of pain, its location, and the degree of instability (amount of pain) within the foot. The location of pain is important to determine from a therapeutic standpoint as any pressure applied under this area in an attempt to support the hoof will exacerbate the pain. The prudent and skillful use of hoof testers can give the clinician valuable information. Hoof testers provide the clinician with insight to the areas of the sole that are most painful. In the laminitic horse the toe and toe quarters are typically the most sensitive but this can vary depending on the severity and type of laminitic episode. Hoof-tester evaluation is useful when positive, but a negative response does not rule out foot pain or laminitis. It is common to have a negative hoof-tester response in a horse with a thick sole and hoof capsule. Horses with equine metabolic syndrome or Cushing’s disease often have a negative response. Hoof testers are also useful to assess the deformability of the sole, which gives a reasonable estimate of sole depth. Bilateral diffuse solar pain across the toe and dorsal wall is considered characteristic for laminitis; however, bilateral foot bruising may yield similar symptoms. Focal pain anywhere in the foot is generally associated with sepsis or abscess formation with the horse assuming a “laminitic” gait to unload on the foot. Hoof wall collapse along the medial quarter and heel is another recognized entity associated with unilateral distal displacement of the distal phalanx can be seen in the acute stage. A marked hoof tester response is often present in this area. It is not fully understood whether this is attributable to a greater degree of lamellar damage in this region or simply to regional mechanical overload on that section of the foot. Variations of the stance and gait are recognized when pain originates in areas other than the toe and dorsal wall. Laminitis involving the dorsal hoof will often present with a heel-first landing. It is not uncommon for laminic horses to land toe first, possibly because the stride is so shortened that they can't extend the digit, or because it is a deliberate action to spread out the duration of loading the foot. In contrast, a horse with palmar foot pain will seldom land heel first, preferring to land toe-first or flat-footed.

The most important determinant of prognosis in the acute laminic patient, and one of the most difficult to access, is the degree of instability between the distal phalanx and hoof wall. At present, we have few, if any, means to make this assessment beyond the amount of pain, serial radiographs, a thorough clinical evaluation and response to therapy. In the first 48 hours of laminis, pain has been shown to correlate well with the degree of histological injury to the lamellae making it a good predictor of instability.

Medical Therapy

Laminitis often originates from an organ system remote from the foot such as the gastrointestinal, respiratory, reproductive or endocrine systems. Therefore, treatment during the acute stage needs to aggressively address the initiating cause of laminitis if known or if treatment of the cause was initiated before the onset of clinical laminitis, it should be continued. As many laminic patients are overweight or obese, a plan to decrease weight should be initiated immediately. Recently, unequivocal evidence confirms an inflammatory response is present very early in the disease before other changes are present in sepsis related
laminitis, suggesting that the vascular changes, thrombi formation, and metalloproteinase degradation of the basement membrane are “downstream” events. The main pharmacologic agents used to treat the inflammatory response in early laminitis are the non-steroidal anti-inflammatory drugs (NSAIDs). The analgesic effects of the NSAIDs is also important from a humane perspective but should be used judiciously so that the clinician is able to accurately monitor the clinical signs in the feet. Clinical improvement from the owners’ perception is a decrease in pain, therefore the clinician may be inclined to increase the dose of NSAID’s or combine NASID’s to appease the client. This practice should be avoided as the analgesic effects of the NSAID’s will increase ambulation and place additional stresses on the compromised lamellae. The most common pharmacological agents used are phenylbutazone (2 – 6 mg/kg PO or IV Sid to Bid), flunixin meglumine (1.1 mg/kg PO or IV SID to TID) and firocoxib (02 – 0.3 mg /kg PO or IV SID or divided BID); DMSO (dimethyl sulfoxide) (1 g/kg as a 20% solution SID or BID), and a vasodilator such as acepromazine (0.002-0.0066 mg /kg PO or IV or IM). Unfortunately, there are no pharmacological agents that are of proven benefit once the initiating events have occurred. The purported anti-inflammatory, diuretic and oxygen radial scavenging properties of DMSO make it a logical choice. The author uses the recommended dosage diluted in 3 liters of saline and administered via nasogastric tube daily for three days. Experimentally, acepromazine increases digital and laminar blood flow in normal horses, but it has not been tested in horses with induced laminitis. The tranquilizing effects of acepromazine may encourage the horse to lay down which can be beneficial. Horses that have developed laminitis associated with insulin resistance such as equine metabolic disease may benefit from early intervention to increase insulin sensitivity. Measures should be taken immediately to reduce the weight of obese horses. The use of ice therapy in the developmental stage of laminitis has been described but its effect once the disease has entered the acute phase has been controversial; however, recent work cited in the literature is encouraging and has indicated that ice maybe helpful in the acute stage.

VII. RADIOGRAPHS

Baseline radiographs consisting of a lateral and DP (dorsopalmar 0 degree) view should always be taken during the initial examination of acute laminitis if possible. The radiographs can be used to determine previous damage, assess foot conformation and guide initial hoof care. Serial radiographs taken at 2-4 day intervals during the unstable period are used to follow the progression of displacement and the speed of progression of the distal phalanx. Venography can be used in the acute stage of laminitis to assess the circulatory pattern of the foot, but the clinician must be experienced in performing the procedure and interpreting the results. The use of local anesthesia is necessary to block the horses foot in order to obtain a venogram which the author feels should be avoided in all cases of acute laminitis.

Farriery

Knowledge of the biomechanics and the forces exerted on the structures of the foot, including the lamellae, are critical to the clinician when formulating a farriery plan to counteract these forces. It is assumed the lamellae suspend the distal phalanx within the hoof capsule and accept weight; therefore, this structure is subjected to three primary mechanical forces. The force of the weight (load) of the horse through the distal phalanx which is opposed by an equal and opposite force called the ground reaction force (GRF). The moment (moment = length of a lever arm x a force perpendicular to the lever arm) about the distal interphalangeal joint is created by the GRF (force) which is also termed the extensor moment. Lastly, the tension of the deep digital flexor tendon (DDFT) exerts a moment about the distal interphalangeal joint that opposes the extensor moment termed the flexor moment (Fig. 1). These mechanical forces exerted on the foot are increased and become detrimental with laminar compromise. A laminitic horse that is painful will be reluctant to move and when not recumbent, the horse’s limbs will be approximately positioned as if in the mid-stance phase of the stride. The load or weight of the horse (opposed by the ground reaction force (GRF)) is located dorsal to the center of articulation and just behind and slightly medial to the apex of the frog on the ground surface of the foot. At breakover, the moment created by the DDFT exceeds that created by the GRF. The tension in the distal DDFT is greatest during the mid-stance phase of the stride than it is at rest, and is further increased as the stride approaches breakover. The opposing moments generated by the GRF and the tension in the DDFT lead to a distractive force within the dorsal lamellae. Dorsal capsular rotation is the most common form of displacement seen in laminitis, and it relates to the inability of the compromised lamellae to accept the load placed on the dorsal region of the foot during weight-bearing and breakover. Through the action of these moments and weight bearing, the lamellae in the dorsal area of the foot are under more tensile strain when compared with the lamellae in the quarters and heels, which along with the frangible circulatory pattern in the dorsal section of the foot will predispose the dorsal lamellae to injury. The GRF determines the load and subsequent compressive and tensile stresses that are placed on the dorsal lamellae. The load or GRF on the foot can’t be changed but the position of the GRF (center of pressure) on the ground surface of the foot can be shifted away from the affected area or redistributed. Support is a term widely used, seldom defined, and often ambiguous. Support usually means to hold a structure in place or prevent it from collapsing. In laminitis, it refers to supporting the distal phalanx and preventing it from displacing from its normal position within the hoof capsule which when considering the weight of the horse, may not be realistic.

Physically applying pressure to the distal phalanx to maintain its position is not feasible without applying pressure to the solar surface of the bone which will compress the solar soft tissues thus increasing pain. And taking the weight off the limb is not usually an option. Therefore, efforts must be directed at reducing the forces that predispose the distal phalanx to rotate/displace. The stresses on the lamellae are
greatest during weight-bearing and locomotion, and an attempt
can be made to redirect these forces by recruiting additional
parts of the ground surface of the foot to bear weight to reduce
the load on the lamellae. Elevating the heels decreases the
moment about the distal interphalangeal joint in a horse at rest
and during mid-stride. Moving the point of breakover in a
palmar direction reduces the stresses on the lamellae at
breakover. In a horse with acute laminitis, the already
damaged lamellae are likely to separate due to the stresses
associated with weight bearing and breakover. Therefore, heel
elevation and breakover modification may both be beneficial.
Indeed, the response to these manipulations is an indirect way
of determining the degree/nature of potential distal phalanx
instability. Raising the heels is unlikely to help those cases
that are prone to distal displacement.

Fig. 1. Figure 1A shows the biomechanical forces (GRF, moments
about the DIP joint and force of the DDFT) exerted on the equine
foot at rest. Figure 1B shows the GRT moving into the toe and
the moment about the DIP joint at the beginning of breakover.

Finally, the sole needs to be considered. In barefoot horses
with a good foot, the conformation and thickness of the sole
is not only protective but functional and can be considered a
limited weight bearing structure. The sole in a shod horse has
reduced functionality when it becomes suspended above the
ground surface of the foot with shoes, plays a limited role in
weight bearing, lacks stimulation, loses sole depth and is often
subjected to inappropriate farriery. In the routine practice of
farriery, one of the most common causes of lameness is
excessive sole pressure in the presence of inadequate thickness
or depth. There are a plethora of pads, devices and materials
on the market that are placed on the sole or under the horse’s
foot to counteract the weight in the early stage of acute
laminitis. The rationale of this methodology of creating excess
pressure on the ground surface of the foot in the face of
insufficient sole depth has to be questioned. The most obvious
limitations of applying physical devices to the foot include the
facts that we are limited to a relatively small surface area in an
attempt to offset profound vertical forces imposed on the digit,
the thickness of the sole and that the application of pressure
through compromised tissue may cause additional pain and
tissue damage.5

VIII. HOOF CARE

Physical measures are often applied to the foot by the
attending or consulting veterinarian during the acute stage of
laminitis. The greatest overall stresses placed on the foot are
associated with weight bearing. To limit the focally increased
stresses placed on the foot during ambulation, it is imperative
that an acute laminitic horse be restricted to the stall. When a
horse is shod or when the horse stands on a hard surface, the
load is concentrated around the perimeter of the hoof wall and
transferred onto the lamellae. In acute laminitis, it may be
appropriate to remove the shoes, which is readily accomplished
by removing individual nails with a short handled crease nail puller (Fig. 2). If the horse is in extreme pain and reluctant to lift a foot, local anesthesia should be avoided and sedation such as detomidine hydrochloride (0.01 – 0.02 mg/kg IV or IM or PO) should be administered to allow removal of the shoes. Weight can be redistributed toward the palmar/plantar section of the foot by applying some type of deformable material to the solar surface of the foot such that the sole, bars and frog in the palmar section of the foot become load sharing with the hoof wall. This can be accomplished by applying either thick styrofoam, one of the deformable impression materials, various pads and boots that are marketed for this purpose or placing the horse in sand (Fig. 3). If sand is used, the author prefers to use beach sand if available. Caution must be used when employing the dorsal area of the sole distal to the dorsal margin of the distal phalanx and the adjacent wall to bear weight. It should be noted that recent biomechanical research has shown that when the foot is loaded, the hoof expands or flares outwards and as a result pulls the sole distally.10 Therefore, applying pressure to the sole in a horse with minimal sole depth (as determined by hoof testers or radiographs) or one that shows pain when hoof testers are applied may in fact further compromise circulation and increase the pain level. Applying shoes in the acute stage of laminitis has not been shown to offer any advantages. In the acute stage of laminitis, the moments about the distal interphalangeal joint at breakover can be modified in the following manner. A line is drawn across the solar surface of the foot dorsal to the frog and assuming adequate sole depth, a rasp is used to bevel the toe in a dorsal direction from this line until it is approximately 25 - 30° to the ground. This effectively moves the breakover palmarly, decreases the pressure on the dorsal lamellae and may lessen the forces created by the DDFT. Additionally, beveling the toe in this manner can reduce the weight bearing area of the sole and thus may reduce the force imposed on the lamellae. This technique may be particularly effective in horses that have minimal sole depth. If the horse is in acute pain and a standing ulcer is present, the foot must be evaluated carefully for an inciting cause such as an acute laminitic foot, sole ulcer, or any other foot or sole condition requiring surgical attention. If the foot cannot be assessed properly or has an inciting cause requiring surgical attention, then the horse should be sedated or under general anesthesia before further attempt is made.
manner reduces weight bearing by the dorsal wall at rest. The moment about the DIP joint at rest can be decreased and the center of pressure is effectively moved in a palmar direction by applying heel elevation. Raising the heels excessively in the acute stage has been advocated but should be done with caution as there is no scientific proof of a beneficial effect. Raising the heels should be avoided if there is a tendency toward distal displacement or if the horse has an offset foot which appears to have a tendency to displace unilaterally.

Laminitis as a consequence of various systemic diseases and/or in the author’s opinion, the administration of corticosteroids often results in distal displacement (sinking) of the distal phalanx. In this case the entire circumferential lamina interface is damaged allowing the distal phalanx to descend or sink uniformly within the hoof capsule. As there is mechanical collapse of digital support around the circumference of the foot, the author has not found elevating the heels in horses with distal displacement to be effective. Moving the breakover back and placing a uniform layer of a deformable impression material on the bottom of the foot or placing the horse in sand may be a better option. With either of these options, the author places a two inch roll of fiberglass casting tape around the distal perimeter of the hoof capsule to provide circumferential stability. The use of foot casts have been described in acute laminitis but have not been used by the author.

Recently the author has used a wooden block or shoe in horses with acute laminitis that are expected to rotate or sink and the results have been very encouraging. The flat solid construction allows the entire ground surface of the foot to be utilized for weight bearing without excessive pressure on the sole. The border of the ground surface of the wooden shoe can be beveled or cut on an angle, which appears to concentrate the load under the digit. They can be applied in a non-traumatic manner and the angle around the periphery of the shoe appears to decrease torque on the lamellae in the toe and the quarters. Two-inch fiberglass casting tape is used to secure the block and limit expansion of the foot (Fig. 4).

An acute case of laminitis should be reevaluated at 48-72 hours for improvement or worsening of the condition. If the horse has not shown marked progress, the horse should be reassessed by the responsible parties regarding treatment plans, and alternatives. The prognosis becomes less optimistic if improvement has not been noted. The client should also be aware that referral facilities exist that may provide additional options.

IX. ETHICAL CONSIDERATIONS

The clinicians should discuss the humane issues surrounding a case of severe acute laminitis from the onset. This is especially important in laminitis cases that have the potential or are displaying clinical and radiographic signs of distal displacement (sinking) as these cases inevitably have a poor prognosis. From a humane aspect it is irresponsible to prolong the life of a chronically painful horse with no chance of recovery or any quality of life. The decision for euthanasia is often subjective and the clinician must take into consideration the owner’s psychological and emotional attach-
Fig. 5. A) illustrates dorsal capsular rotation, B) illustrates mediolateral rotation and C) illustrates distal displacement.

Fig. 6. Radiograph of asymmetrical displacement of the distal phalanx on the medial side. Note the solar foramen are not parallel with the ground. Also note the disparity in the joint space from the lateral to the medial side.

Fig. 7. A schematic representation of a lateral radiograph of a foot with dorsal capsular rotation can be used as a template when trimming. A line is drawn approximately parallel and about 15 mm distal to the solar surface of the distal phalanx. A second line is drawn parallel and approximately 15 – 18 mm dorsal to the parietal surface of the distal phalanx. The arrow at the intersection of the two lines is the furthest dorsal point the toe of the shoe should be set. The second arrow is approximately 6 mm dorsal to the dorsal margin of the distal phalanx and is the approximate location of the point of breakover (picture courtesy of Dr. Andrew Parks).

Fig. 8. A schematic diagram of a horse’s foot with rotation before (A) and after being trimmed (B) according to guidelines in figure 7. Note that diagram (C), the dorsal and palmar aspects of the ground surface now form 2 different planes (picture courtesy of Dr. Andrew Parks).
assumptions that a given treatment should work and anecdotal chronic laminitis are based on tradition, theoretical medical and farriery techniques, used to treat acute and penetration will prevent recovery.

the coronet, the disruption of the lamellae and the solar laminitis. The displacement of the distal phalanx, the position of coronet, the disruption of the hoof capsule in a relatively short period of time) (Fig. 10). If a decision is reached to euthanize a horse, the decision should be unanimous among all the members of the team. The clinician should recommend and encourage the owner to seek a second opinion. The attending or consulting veterinarian or farrier should never imply to the owner that had a different approach or mode of therapy been initiated at a particular time, the outcome of the case would have been different. There is no scientific evidence to support such a derogatory statement, it casts doubt on the professionalism of the clinicians involved and opens the door for possible litigation.

Fig. 9. A wooden shoe applied to the foot with impression material. Note the point of breakover on the ground surface of the shoe which corresponds with a vertical line drawn from the coronet.

Fig. 10. Lateral and DP radiograph of a horse with severe laminitis. The displacement of the distal phalanx, the position of the coronet, the disruption of the lamellae and the solar penetration will prevent recovery.

X. SUMMARY

Unfortunately, many of the treatment regimens, both medical and farriery techniques, used to treat acute and chronic laminitis are based on tradition, theoretical assumptions that a given treatment should work and anecdotal evidence that a certain type of treatment has worked on previous cases. There are no controlled studies confirming or comparing the efficacy of the numerous treatments in use nor is there any scientific proof that one treatment is superior to another. What are well documented are the forces and mechanics applicable to the equine foot. Clinicians (veterinarians and farriers) may be better served by a thorough knowledge and understanding of the anatomy, physiology and function of the hoof. Understanding the foot in a mechanical sense may allow better application of a preferential treatment protocol.

Treatment of laminitis has to be a team effort equally shared between veterinarian, farrier and owner. The intent of this paper is not to discourage treatment of laminitis but to create expectations that are realistic, humane, and based on the cause of the disease, amount of lamellar damage, pain, duration and the financial constraints involved in prolonged treatment. At the onset of treating severe laminitis, certain guidelines can and should be outlined to indicate the efficacy of the chosen treatment method along with a reasonable time frame for improvement. These guidelines could be a change in stance, decreased digital pulse, increased comfort, horn growth at the coronet, sole growth, etc. If the desired improvement is not observed or the condition gets worse, the overall farriery methods should be reassessed and changed where necessary.

With severe laminitis cases, we are often unable to rehabilitate the horse to where it has an acceptable quality of life. The main reason being that there are insufficient laminar structures remaining within the hoof to achieve realignment and accept weight. The author feels it is important, from a humane perspective, to know when to discontinue treatment that has not been effective. Often we persevere with various treatments, put the horse through much unnecessary suffering, only to achieve an unsatisfactory outcome. It is unlikely that this disease can ever be fully eliminated nor is it likely that there will ever be a single drug or other line of therapy to consistently treat acute or chronic laminitis so our clinical and research efforts should be divided between prevention and treatment.

REFERENCES AND FOOTNOTES


c. Flunixamine. Fort Dodge Animal Health, Fort Dodge, IA 50501.

d. DMSO. Fort Dodge Animal Health, Fort Dodge, IA 50501.

e. Promace. Fort Dodge Animal Health, Fort Dodge, IA 50501.

f. Lopez crease nail pullers. Lopez Farrier Tools, Santa Maria, CA 93455.