Approaches to managing laminitis

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David Rendle encourages practitioners to be proactive in tackling laminitis with owners and welcomes new emphasis on treating underlying conditions.

LITTLE has changed in the medical management of acute laminitis and most treatment decisions are based on anecdotal experiences and reports. Progress has been made in remedial farriery for laminitis and a number of systems can help improve the comfort and prognosis of subacute and chronic laminitis cases, although regretfully, there is no evidence on which options are associated with the best outcomes.

The majority of laminitis cases occur as a result of preventable endocrine disease, pituitary pars intermedia dysfunction (PPID or equine Cushing’s disease) or equine metabolic syndrome (EMS), and many are a direct consequence of inappropriate diet and management.

It is a travesty that so many animals suffer each year as a result of this disease and we should endeavour to be proactive in investigating underlying causes, aggressively treat animals that are at risk and educate horse owners of the need to re-evaluate how they feed and manage their horses.

The 2013 National Equine Health Survey, led by Blue Cross, revealed a laminitis prevalence of 4.4 per cent, similar to the 3.6 per cent reported in 2010 to 2012. A more robust cohort study indicated laminitis was diagnosed in around one in 200 horses under veterinary care. The difference in reported prevalence between the owner and veterinary surveys may be due to differences in the study methods, but may also reflect most clinicians’ experiences that laminitis is often not reported to veterinary surgeons.
Some owners become so familiar with the condition they cease to treat it as promptly or aggressively as they should; the result being an increase in the risk of chronic digital pathology and an increased likelihood of recurrence.

Other studies of the frequency of laminitis were appraised in a review by Wylie et al (2011). Ten studies were considered to provide the most reliable information, with estimates of laminitis ranging from 1.5 per cent to 34 per cent. Whichever estimate of frequency you choose, it is clear laminitis is a massive welfare concern in the UK equine population.

As a profession, we have traditionally adopted a fire brigade approach and reacted to laminitis when it has arisen. However, recent initiatives, such as the Talk About Laminitis campaign and a large volume of published research, have led to adoption of a more proactive approach to laminitis, with more emphasis being placed on treatment of conditions such as PPID and EMS that predispose to laminitis.

**Management of acute and sub-acute disease**

Little has changed in the management of acute laminitis for many years and, despite attempts by BEVA and others to gain evidence on how best to treat the disease, recommendations are generally based on anecdotal experiences.

**Anti-inflammatories**

NSAIDS are indicated to mitigate the inflammatory changes that develop within the foot and, in the minority of laminitis cases that occur secondary to endotoxaemia, also to block the systemic inflammatory response induced by circulating endotoxin. Other drugs with anti-inflammatory and/or free radical scavenging properties, such as pentoxifylline and dimethylsulfoxid (DMSO), have been used, but have no evidence basis and anecdotal experiences are generally disappointing.

A mast cell stabiliser is undergoing trials in the US and is widely being reported as a potential cure for all forms of laminitis in the international equestrian press. In the author’s opinion, although the drug has been trialled in well-renowned institutions it should be regarded with scepticism until results of the cited studies are subjected to peer review. This author is unaware of any evidence suggesting mast cells have an important role in the aetiopathogenesis of laminitis and they did not receive a mention in a review of current theories on the aetiopathogenesis of laminitis.

**Analgesia**

In addition to inhibiting inflammation, the NSAIDS are also the most clinically and costeffective means of providing analgesia. Flunixin meglumine is often given in acute cases and phenylbutazone in more chronic cases, but these selections are not evidence-based. Some horses
appear to respond better to one NSAID than others, but phenylbutazone is generally the most
costeffective option and typically provides unsurpassed analgesia.

Other analgesics, such as opioids, paracetamol and gabapentin, can also been used in an
ambulatory setting, but if such additional analgesia is required it is likely other aspects of case
management, such as digital support, are suboptimal and case management should be reviewed.
Perineural analgesia is effective, but only provides transient relief.

In a hospital setting constant rate infusions with various combinations of acepromazine, ketamine,
alpha-2 agonists, lidocaine and opioids are effective but, again, if they prove necessary questions
need to be asked whether other aspects of case management could be improved. Hospitalisation
not only enables multimodal analgesia to be administered, but also offers a better opportunity to
constantly modify and re-assess digital support and more regularly review clinical progress. While
there are understandable concerns over transporting horses with unstable feet, in this author’s
opinion the benefits of hospitalisation generally outweigh the risks.

Vasodilators

Vasodilators have traditionally been used in an attempt to increase blood flow to the laminae during
acute laminitis as, regardless of the precise events that take place during developmental laminitis,
it is likely that by the time laminitis is diagnosed clinically there will be a reduction in laminar blood
flow.

Acepromazine is used widely, although the evidence available suggests while it may increase
blood flow to the digit it is unlikely to result in increased perfusion of the laminae. However, even if
it is not beneficial as a vasodilator, the tranquilising effects of acepromazine may be of benefit in
discouraging movement and encouraging more time spent in recumbency. The topical application
of glyceryl trinitrate, which undergoes conversion to nitric oxide in the walls of blood vessels, to
digital vessels is likely to be similarly ineffective in increasing laminar blood flow.

Mechanical support

Mechanical support is crucial in preventing lasting structural change within the digit that will
dramatically worsen prognosis. It is essential box rest is enforced to reduce the risk of laminar
injury. Radiographs should be considered at an early stage if possible to assess existing damage,
assist the farrier and act as a point of reference for the future. While expensive, they are likely to
prove cost-effective in the longterm. The aims of mechanical support are:

• transferring load away from the affected laminae;

• supporting the sole without causing solar vascular compromise;
• easing break-over and reducing forces about the distal interphalangeal joint; and

• reducing tension in the deep digital flexor tendon.

Standard shoes concentrate loading around the outside of the foot and should ideally be removed. If laminitis is predicted, shoes should be removed before the onset of clinical signs. Some argue removal causes further laminar trauma, but if performed carefully using appropriate analgesia, shoes should be able to be removed without causing further damage or excessive discomfort. An alternative to shoe removal is packing of the sole within the shoe with impression material, but this limits the use of other superior support systems.

Conforming bedding can provide reasonable support if it is deep (six inches), but is unlikely to be as effective as frog and sole support systems. “Lily pads” are simple to apply and can be trimmed to fit the frog, but the author finds they provide limited support and are not well tolerated by most patients.

A greater degree of support is provided with more conforming materials. Sole putties are simple to use in combination with foam pads and enable loading to be distributed across the palmar/plantar sole and frog away from the point of the pedal bone (Figure 1). Solar support can also be provided with high-density Styrofoam (Figure 2) that conforms to the sole; however, these pads tend to fall off and thinner Equisoft systems are more effective in this author’s hands (Figure 3).

Styrofoam should not be used in association with deep bedding as it will not compress and will have a tendency to slip. By retaining the palmar/plantar portion of a crushed pad prior to adding a further layer of Styrofoam, further support can be provided, but conforming impression material provides an easier and instant alternative.

Virtually all cases can be made more comfortable with some form of support; however, often a degree of trial and error is required to match the support to the animal. Smaller ponies that are not of sufficient weight to crush Styrofoam usually do better on Equisoft pads.

Although remedial farriery systems are typically applied in chronic laminitis cases, they may help some patients in the sub-acute phase and can be better tolerated than temporary support systems. If temporary systems aren’t providing the expected degree of comfort, it is worth consulting with an experienced remedial farrier on longer term options sooner than you may have planned. No evidence supports the use of one system over another and the chosen option comes down to clinician/farrier preference.

While still favoured by some, traditional metal heart bars are unforgiving and not tolerated well by all patients. They offer less flexibility than more modern systems and are harder to tailor to the changing requirements of an individual horse’s laminitic foot. Plastic options such as the Imprint System offer a more flexible alternative to metal heart bars and are often better tolerated.
At Liphook Equine Hospital Steward Clogs, in combination with a flexible compression material (Figure 4a), are the preferred option currently as they can be individually shaped for each patient, enabling pressure points to be unloaded and forces to be distributed across the remaining frog and sole. The clog provides a rocker in all directions eliminating any dorsal or lateral forces that would normally be generated prior to break-over.

If remedial farriery is not a viable option or if there is a delay before it can be performed, it is often possible to improve comfort and reduce the risk of further mechanical damage by bevelling the hoof wall to ease break-over and applying a foam pad in combination with compression material as described above.

**Preventing recurrence**

Laminitis may occur secondary to endotoxaemia, excessive concussion, contralateral lameness resulting in excessive weight bearing, glucocorticoid administration and carbohydrate overload. However, the overwhelming majority of cases are insidious in onset and occur in association with increased quality and/or quantity of grazing.

While not all researchers agree, there has been a shift away from the theory that pasture-associated laminitis occurs as a result of overloading the large intestine and disrupting microbial flora towards the idea that sustained excessive soluble carbohydrate intake results in chronic hyperinsulinaemia in susceptible animals. Though the mechanisms are not understood, in experimental studies marked acute hyperinsulinaemia results in laminitis\(^5\)\(^6\) and it is suspected more chronic moderate hyperinsulinaemia may ultimately do the same.

Other research groups are investigating aberrations in cortisol biosynthesis and vascular flow as potential mechanisms by which laminitis may develop and it is likely that many mechanisms will contribute, either alone or in combination, to the development of laminitis. While we wait for the fog to clear we should focus on eliminating those factors known to be associated with the disease.

Recent epidemiological investigations have demonstrated that the majority of cases of laminitis are associated with either PPID or EMS with the probable link between both conditions and laminitis being hyperinsulinaemia\(^7\)\(^8\). PPID is a disease associated with ageing; however, the age of onset is variable and there are several published reports of histopathologically confirmed disease in animals under 10 years of age\(^9\)\(^10\). Furthermore, laminitis is frequently the only clinical sign of PPID, especially in younger horses (Jo Ireland, personal communication).

Testing for PPID should be considered in all horses with laminitis regardless of age and even if none of the other clinical signs typically associated with PPID, such as hirsutism/hypertrichosis, lethargy, polyuria, polydipsia, recurrent infections, fat redistribution or muscle wastage, are present. Measuring plasma adrenocorticotropic hormone concentration gives a straightforward, reliable laboratory test for PPID and is free (www.talkaboutlaminitis.co.uk). Pergolide is an effective treatment for laminitis and the frequency of laminitis reported to reduce in animals receiving
Horses with PPID should also be subjected to careful dietary management in addition to treatment with pergolide to limit hyperinsulinaemia.

EMS describes a syndrome of obesity, hyperinsulinaemia and an increased risk of laminitis and should also be considered in all cases of laminitis. Owners have a skewed perception of the body condition of their horses – up to 50 per cent of the UK equine population is overweight yet only 20 per cent to 30 per cent of owners will recognise their horses need to lose weight. Even fewer are inclined to act on the knowledge their horses are overweight.

Typically, horses with EMS are overweight, but horses of normal appearance should also be tested for EMS as some animals with focal adiposity can be hyperinsulinaemic and at risk of laminitis. There is debate over the best means of testing for hyperinsulinaemia and insulin resistance. It is agreed resting insulin levels are an insensitive means of diagnosing hyperinsulinaemia and challenge tests using orally or intravenously administered glucose are preferred. A combined insulin glucose tolerance test has been evaluated as a test for insulin resistance, but is not popular in ambulatory practice even though the test can be abridged or simplified.

A more practical, but less well-validated, alternative is assessment of the insulin response to oral glucose. Owners can administer a bolus of 1g/kg bodyweight glucose in a feed of chaff and measure insulin levels two hours later. The choice of test is less important than a willingness to identify and, where necessary, test those animals at risk of laminitis as a result of EMS. While often helpful for diagnosis, objective monitoring and as persuasive evidence for sceptical owners, testing for hyperinsulinaemia/insulin resistance may not be necessary if owners can be persuaded on clinical signs alone to take steps to treat the condition.

Once identified, animals with hyperinsulinaemia/insulin resistance should undergo a programme of controlled weight loss with regular monitoring and re-evaluation of targets to ensure compliance. Metformin is fashionable as a treatment for hyperinsulinaemia/insulin resistance and, although it blunts the insulin response to oral glucose in the short term, it is questionable whether this translates to a genuine clinical benefit. Metformin is absolutely no substitute for adequate dietary restriction and is unlikely to be of any additional benefit if dietary management is appropriate.

**Conclusions**

Management of acute laminitis is a damage limitation exercise aimed at preventing further structural damage using anti-inflammatory agents and mechanical support. Almost all cases of laminitis are preventable and we need to take a more proactive approach in identifying and addressing risk factors for laminitis. Awareness of PPID has increased but we should be open-minded to this condition in all but the youngest horses and those without other clinical signs. We should also endeavour to identify, and play an active role in managing, horses with EMS and educate horse owners of the need to re-evaluate how they feed and manage their horses.
• Please note not all drugs mentioned in this article are licensed in the UK.

References

Figure 1. Impression material used to provide palmar sole and frog support.
Figure 2. Styrofoam pads can be shaped to the individual patient to provide temporary support.
Figure 3. Equisoft pad used in combination with impression material and adhesive to
provide temporary support. Much like Styrofoam pads they can be shaped and taped to the foot.
Figure 4. The Steward Clog used with compression material and adhesive to provide longer term support. The clog can be marked and modified to best suit the patient and provide optimal support.
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