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Historical perspective of laminitis
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Keywords: laminitis, history, founder, equine

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Thanks to Google for digitizing many old books, and thanks to the National Agricultural Library, the libraries at the University of Pennsylvania, the University of Michigan, Cornell University, and especially to Susanne Whitaker of the Flowers Veterinary Library at Cornell for her skill in finding sources when I could not.

Historical perspective of laminitis

By Henry Heymering

What has been will be again, what has been done will be done again; there is nothing new under the sun. Is there anything of which one can say, "Look! This is something new"? It was here already, long ago; it was here before our time. There is no remembrance of men of old, and even those who are yet to come will not be remembered by those who follow.

– Ecclesiastes 1:9-11 NIV

History does not change, however, our perspective of history changes as new research and discoveries emphasize previous ideas. Therefore, this article will have much in common with a previous work by Ilka Wagner and this author,¹ and another by this author alone.² I have separated the history into some generally recognized periods, adjusted slightly for seamless coverage. This chapter covers *terms*, and **treatments** of veterinary medicine (medications, surgery), farriery (trimming, shoeing), and management (diet, footing, exercise). Where possible, I have identified links from historical treatments to the present, Post Modern period. Unless otherwise noted, for clarity I have mentioned only the earliest written record of each treatment that I could find.

Ancient History

In 3500 BC the Sumerians were known to use most of the current methods of drug delivery (pills, poultices, infusions, ointments, troches, etc.),³ and an ancient Sumerian script mentions cattle doctors.⁴ The earliest known equine veterinary writings date to 2500 BC in China, 1900 BC in Egypt, and 1800 BC in India,⁵ but the written record of laminitis is more recent.

Although attention to feeding and watering after exercise suggest the Hittites in 1350 BC were aware of laminitis⁶, Xenophon (380 BC) may have been the first to write about laminitis. Xenophon mentions *barley surfeit*, without describing symptoms, and goes on to say, “diseases are easier to cure at the start than after they have become chronic and have been wrongly diagnosed.”⁷

Aristotle (330 BC) also mentions barley-surfeit, but the signs of disease described (“evidence of the ailment is softening of the palate and hot breath”⁸) are not those of laminitis. However, Aristotle describes grass founder: “Among horses, those at pasture are free of all ailments except *foot-ill*, but they suffer from this and sometimes cast the hooves. ...the casting of the one hoof takes place simultaneously with the growing of the other hoof underneath. Evidence of the ailment: the right testicle twitches....”⁹ Once again, the “evidence” described does not fit. Smith notes that Aristotle’s writing [possibly the signs of disease?] may have been altered, “In Book VIII veterinary medicine is dealt with, and the translator warns us that this part bears evidence of an alien hand.”¹⁰

Roman Empire (27 BC - 500 AD)

Columella (55 AD) describes laminitis as *blood descending to the feet*. He notes that the feet are hot to the touch, and for treatment recommends **bleeding** from the middle of the leg.¹¹ Bleeding is the first recorded treatment for laminitis. Pliny (50 AD) described bleeding for overeating in general, not necessarily laminitis.¹²

Apsyrtus (early 4th century), the ‘father of veterinary medicine,’ refers to acute laminitis as *barley disease* and treated it by **dietary restriction**, and **exercise** in addition to bleeding – “Slowly and gradually the animal warmly clothed is driven up and down until sweating occurs; the body must then be dried.”¹³

Chiron (4th century), shows a clear understanding of laminitis, describing *suffusion of the feet* as the horse being unable to walk, with heat and blood in the hooves, and possible separation of the hoof wall from the laminae.¹⁴ Chiron may have been a pseudonym for Hierocles,¹⁵ a lawyer-veterinarian, who described laminitis as being caused by drinking quantities of cold water when heated.¹⁶

Publius Vegetius Renatus (480), makes numerous references to the troubles from over-feeding of barley.¹⁷ Vegetius in one part recognizes laminitis as a *suffusion* in the feet due to work and fatigue on a long journey. In another section Vegetius deals with laminitis under the heading of *Gout*. For treatment, Vegetius recommended **purges**, and **febrifuge**, in addition to moderate bleeding, diet and exercise. Exercise is to be continued daily with a laxative diet of “green meat [fresh cut grass and other greens¹⁸] with **nitre** [potassium nitrate aka saltpeter, used to reduce fever] sprinkled over it.” If the animal is not responding to the treatments then **castration** is recommended, “for gout seldom affects eunuchs.”¹⁹ Laminitis was confirmed more prevalent in stallions than geldings by Dorn (1975).²⁰

Dark Ages (500 to 900)

During the Dark Ages the modern horse collar; the stirrup; and shoeing with iron shoes and nails were developed,²¹ but there is no written record of their invention, or of any veterinary advances in laminitis, during the Dark Ages.

High Middle Ages (900 – 1450)

Despite being very expensive, shoeing became so popular during the Crusades (1095-1291), that Guibert of Nogent wrote, “Truly astonishing things were to be seen ... poor people shoeing their oxen as though they were horses.”²² Jordanus Ruffus (1250), Senior Imperial Marshal [farrier²³], is the first to mention the operation of **unsoling** [peeling back and removing the entire sole – **drawing the sole**, as LaFosse (1759) called it²⁴], which was used to treat laminitis for more than 600 years – until the practice was stopped by an S.P.C.A. lawsuit in the late 19th century.^{25,26}

Age of Discovery (1450 – 1700)

Fitzherbert (1548) was the first to recommend **shoeing** to treat *morfounde* or *pomis*, “... good paryng and shoyng as he ought to be will do good service.”²⁷ Presumably, “as he ought to be” indicates that the heels were to be lowered and the toe dressed back – trimming away the unnatural growth – but specific directions did not appear until Russell (1878 – see below).

Malbie (1576) was the first to publish a book entirely on laminitis – guaranteeing a cure to acute laminitis largely by exercise.²⁸ Andrew Snape (1683), Serjeant-Farrier²⁹ to Charles II, was the first to recommend **vertical hoof grooving** which is still used today.³⁰ Snape describes one cause of what he calls *Founder* as standing in water after hard riding.³¹

Modern Era (1700 – 1949)

Bridges (1751) recommended leaving the horse at **liberty on a good bed**³² – proven effective by Hood (1981).³³ Osmer (1766) follows Snape in recommending vertical hoof

grooving for founder, and directs when “a *crisis of fever falls on the feet* [laminitis] ... the proper method of acting is to **cut them off round and short at the toe**, till the blood appears...”³⁴ *Chest founder*, as described by Osmer (1766) and then quoted by Freeman (1796), is navicular disease, not founder.^{35,36}

Bourgelat (1771), founder of the veterinary school at Lyon, France, recommends an **adjusted shoe** – cradle-like in profile (illustrated in Fleming).³⁷ This style of shoe was used by Dollar (1898),³⁸ Churchill (1912),³⁹ and a shoe with a similar profile of the ground surface was used by Roberge (1894) to treat laminitis.⁴⁰ More recently, wooden “**rocking horse shoes**” or “**clogs**” in similar profile are recommended by Steward (2002),^{41,42} and similar “**banana**” or “**rock and roll**” shoes are recommended by Redden (2006).⁴³

Vial de Saint Bel [aka Sainbel] (1793), first head of the Veterinary College of London, takes notice of “a *strong pulsation*”⁴⁴ and treated laminitis with **cold water**.⁴⁵ Rather than vertical grooving, Sainbel did a **resection** “the breadth of two fingers.”⁴⁶ Smith notes that many of Sainbel’s treatments came from LaFosse, though Sainbel coined the term *laminae*.⁴⁷ Herbert Mayo (1823) was the first to describe the *secondary laminae*.⁴⁸

Youatt (1831) also notices the *digital pulse* saying, “the artery at the pastern will throb violently.”⁴⁹ Dadd (1866) notes that, “this increased pulsation seems due to obstruction in channels through which blood usually circulates with freedom, while the same or even an augmented force continues to impel it.”⁵⁰ Youatt is the first to recommend **pads** to treat *inflammation of the feet*⁵¹ [probably pedal osteitis – which Rooney (2007) says is road founder⁵²]. Youatt recommends **wide-web barshoes**, seated out to prevent direct sole pressure.⁵³ Youatt recommends **digitalis** as a sedative.⁵⁴ To relieve the pressure in the hoof Youatt recommends **softening the hoof wall** with poultices, removing the shoes, paring the sole as thin as possible, and rasping the outer hoof wall especially at the quarters.⁵⁵

Scheafer (1863), in a book on homeopathic veterinary medicine recommends **homeopathic aconite**, along with numerous other homeopathic medicines for laminitis.⁵⁶ Holcombe (1890) uses **aconite** to treat laminitis, to slow the heartbeat.⁵⁷ Aconite, also known as monkshood or wolfbane was tricky to administer as the effective dose was very close to the toxic dose. It has been abandoned as too toxic. However, homeopathic aconite is currently used as an early treatment for acute laminitis to help regulate the pulse,^{58,59} and for reducing blood pressure.^{60,61}

Dadd (1866) says, “Should the patient evince signs of much agony, give a few drenches of infusion of **hops or poppy heads**.”⁶² This may be the first use of **pain medication** for treatment of laminitis even though opium was mentioned as far back as the *Ebers Papyrus* (c. 1550 BC).⁶³ Dadd (1854) recommended anesthesia for surgery on horses, but it was not adopted until about 40 years later.⁶⁴ Dadd (1866) used **arnica tincture** given in clear water for laminitis.⁶⁵ Seeley (2006) proved the usefulness of homeopathic arnica in reducing bruising and swelling.⁶⁶ Dadd (1866) reports laminitis affecting only the hind feet,⁶⁷ which we find commonly in cattle, but not horses.⁶⁸

Russell (1878) recommended soaking in **warm water** for the first 24 hours.⁶⁹ Although not calling it a **resection**, Russell clearly describes removing the wall across the whole toe, down to serum: “In preparing the foot for the proper levels of the shoe, commence at the heel, lower both sides as much as can be safely borne, and this operation must be carried forward toward the quarters. ... The front part of the hoof must next be weakened, by rasping from coronet to ground surface, until serum is apparent, extending this operation back to the quarters,” and a roller-motion shoe applied.⁷⁰ **Resections** were proven effective by Peremans (1991).⁷¹

Zundel (1886) describes the *laminar wedge*,⁷² and the sole being perforated by the tip of the coffin bone.⁷³ Zundel implicates hot weather as a cause of laminitis,⁷⁴ which has also been reported by Young (2004).⁷⁵ Zundel mentions hoof trauma, such as being crushed under a wagon wheel, as a cause of laminitis.⁷⁶ Zundel describes *chronic laminitis* as, “a sub-inflammatory state of acute laminitis.”⁷⁷ Zundel advises against taking off the shoes.⁷⁸ Zundel mentions treatment by **forced recumbency**.⁷⁹ Zundel makes no mention of medication to treat pain (only fever) from laminitis however, he writes about Bouley’s use of **neurotomy** to treat laminitis, but Zundel does not recommend it because it often results in sloughing of the hoof.⁸⁰ Zundel speaks of laminitis from being kept in a sling, and he describes laminitis of the opposite leg when one leg is unable to support weight.⁸¹ Rooney (2007) reports that allowing free movement of the horse on three legs prevents supporting leg laminitis.⁸²

Zundel describes an operation by Gross of **thinning the wall** in a broad (4 cm) horizontal band near the coronet from heel to heel all around the hoof.⁸³ Zundel mentions Silberman’s use of a **steel band**, two fingers wide⁸⁴ – similar to the currently marketed Nolan Hoof Plate®.⁸⁵ Zundel describes apparatus for the cooling of feet in laminitis – including the use of **snow or crushed ice**⁸⁶ – this was proven effective in reducing developmental stage laminitis by van Eps and Pollitt (2004).⁸⁷

Zundel recommends shoes and **pads** to treat laminitis: “Between the shoe and the foot a piece of gutta percha [rubber], or felt or leather may be put on. Thus shod, a horse will still do long service, even in cities, and much more in the country.”⁸⁸ In the late 1800’s a plethora of pads were developed to reduce concussion and slipping. Dollar (1898) and Hunting (1941) each devote entire chapters of their books to pads but do not mention them for treating laminitis.^{89,90}

Dollar (1898) recommends a **full-rocker “cradling” eggbar shoe** for dropped sole following laminitis. Dollar illustrates a **heartbar shoe** but only recommends it for frog pressure, to widen the hoof, and he does not mention it for laminitis or founder.⁹¹ Chapman & Platt promoted treating laminitis with heartbar shoes in the early 1980’s.^{92,93,94}

Axe (1907) recommends stronger pain medication, “a full dose of **morphia** may be injected beneath the skin.”⁹⁵ While Zundel mentions “alkaline remedies ... to render the blood more fluid”⁹⁶ Hodgins (1907) suggests the use of **oral bicarbonate of soda** (antacid) for laminitis.⁹⁷ Histamine is only produced in the gut in quantity when the diet contains grain and the gut has become overly acidic.^{98,99}

Martin (1916) may be the first to implicate microbes as a cause of laminitis.¹⁰⁰ Martin speaks of injecting local anesthetic, but he finds, “removal of pain in the feet, may cause the animal to place its entire weight for too long a time on its inflamed feet and thus cause a rapid descent of the pedal bones within the hoof, that might not otherwise have occurred.”¹⁰¹ For the same reason, George Platt (2006) feels that giving **phenylbutazone** only makes laminitis worse.¹⁰²

Merillat (1920) reviews Straunard (1918), following his recommendations. Merillat says of **bleeding**, “Jugular venesection is recommended. Six to ten liters of blood are withdrawn. This lowers the blood pressure for a definite time.... It may cure without delay.”¹⁰³ Merillat says of **exercise**, “Exercise is very beneficial in founder. The patient emerges from the stable with great difficulty and great apprehension, but after a few minutes walks easily. The pain noticeably diminishes and the blood-pressure of the foot becomes lower. The pulsation of the metacarpals becomes more feeble, even after a few yards of walking. ... The walking should be continued for not less than a quarter of an hour. The longer the better.”¹⁰⁴ In contrast, Backus (1937) reports,

“If the horse is forced to move, the evidence of pain partially subsides, but after the patient is allowed to rest, the pain is more severe than before.”¹⁰⁵

Åkerblom (1934) successfully experimented with carbohydrate overload to induce laminitis.¹⁰⁶ Åkerblom was able to produce symptoms of laminitis by injecting repeated small doses of histamine intravenously and identified the bacterium responsible for the decarboxylation of histidine in the equine intestine as *B. coli*.¹⁰⁷ Åkerblom also suggested that other toxic amines, particularly tyramine, may play a part.¹⁰⁸ Turner (1937) asserts, “the harmful effect [causing laminitis from overeating] is destroyed by cooking.”¹⁰⁹

Rodebaugh (1938) recommends the addition of 3/4” heel caulks on the shoe to relax the deep digital flexor tendon.¹¹⁰ Since caulks only act to **raise the hoof angle** on hard footing (footing which is contraindicated), effectively raising the hoof angle was not accomplished until Redden (1992).¹¹¹ Other writers on laminitis, such as Coffman (1970),¹¹² Goetz (1989),¹¹³ and Moore (1916) insist, “...elevating the heel increases the pain...”¹¹⁴ Research by McGuigan (2005) found that once 6 to 13 degrees of rotation has taken place, the force pulling on the DDF tendon is zero for the first 40% of the stance phase.¹¹⁵

Frank (1944) recommends **horizontal hoof wall grooving** (0.25” wide instead of Gross’s 1.5” wide) all the way around the hoof from heel to heel for treatment of some cases of chronic laminitis.¹¹⁶ Johnson (1975) grooved just at the dorsal toe rather than from heel to heel,¹¹⁷ and Ritmeester (1998) proved its effectiveness.¹¹⁸ For acute laminitis Frank injects 125 to 150 cc’s of **autologous horse serum** or whole blood, either subcutaneously or intramuscularly – also recommended by Thomas (1945),¹¹⁹ Adams (1966),¹²⁰ and currently used to treat tendonitis in humans.

Chavance (1946) reported that injection with **antihistamines** was an effective treatment for laminitis.¹²¹ *Allisonella histaminiformans*, which produces histamine directly from histidine in grains, is found in the cecum of horses.¹²² Histamine is involved with many of the different causes of laminitis. Nocek (1997) notes, “histamine release can be caused by a variety of factors other than nutritional origin, such as environmental stress, concussion, trauma associated with concrete floors, overcrowding, and infectious diseases, causing tissue breakdown.”¹²³ Acute laminitis in cattle can be caused by subcutaneous injection with histamine, and bovine laminitis from overeating can be alleviated by antihistamine.¹²⁴

Obel (1948) gave us the familiar grading system for laminitis by his name.¹²⁵ Using the oral administration of a broth containing colibacillosis and feeding rye free choice, Obel induced experimental laminitis for study.¹²⁶ Obel also found the separation in laminitis to take place in the “keratogenic” zone of cornification of the secondary epidermal laminae.¹²⁷ Larsson and Obel (1956) then discovered, “methionine has been found to be incorporated to a much higher degree than cystine in those parts of the hoof matrix where the factors causing laminitis seem to strike primarily.”¹²⁸

Post Modern (1949 – Present)

There was little progress in the Post Modern period until the 1980’s when there began an explosion of research and controversy, which continues today. Unfortunately, this has not yet resulted in a solid foundation of knowledge, but rather a sea of uncertainty.

There have been at least 25 books, booklets, or monographs written solely about equine laminitis. All but four of them were written in the Post Modern period:

Malbie (1576),¹²⁹

Jubin (1908),¹³⁰

Straunard (1918),¹³¹
 Obel (1948),¹³²
 Abdin-Bey (1984),¹³³
 Chapman & Platt (1984),¹³⁴
 Taylor (1988),¹³⁵
 Eustace (1992),¹³⁶
 Moore & Allen (1995),¹³⁷
 Coumbe (1996),¹³⁸
 American Farriers Journal (1997)¹³⁹
 Redden (1998),¹⁴⁰
 Hood (1999),¹⁴¹
 Buff (2000)¹⁴²
 King & Mansmann (2000),¹⁴³
 USDA (2000),¹⁴⁴
 Jackson (2001),¹⁴⁵
 Pollitt (2001),¹⁴⁶
 Ramey (2003),¹⁴⁷
 Strasser (2003),¹⁴⁸
 Hamilton-Fletcher (2004),¹⁴⁹
 Buff (2005)¹⁵⁰
 Butler & Gravlee (2007),¹⁵¹
 Sillence, Asplin, Pollitt, et al. (2007),¹⁵² and
 Parker (2009).¹⁵³

Each of these publications has a different view – often diametrically opposed to others. Because we have so little solid knowledge, these books are necessarily largely empirical and speculative.

Of the dozens of suspected causes of laminitis, only four have been shown to reliably create laminitis for the purposes of research: starch;¹⁵⁴ black walnut;¹⁵⁵ oligofructose;¹⁵⁶ and insulin.¹⁵⁷ Of the dozens of medicines and treatments recommended for laminitis, only eight have been proven by at least one controlled experiment to be effective: (**virginiamycin** – only for pre-treating for carbohydrate overload;¹⁵⁸ **resection**;¹⁵⁹ horizontal **dorsal coronary wall grooving**;¹⁶⁰ deep, soft **sand footing**;¹⁶¹ **heparin** – as a preventive given 30 minutes after carbohydrate overload¹⁶², or immediately after colic surgery¹⁶³; **DMSO**;¹⁶⁴ **BAT TG 1000**¹⁶⁵ – a calcium channel blocker given 4 hours after the initial insult; and **cryotherapy**¹⁶⁶ – in the developmental stage).

We’ve had nearly 2000 years of bleeding as treatment, 1700 years of exercise as treatment, and more than 40 years of phenylbutazone as treatment – without proof of effectiveness in treating laminitis. Although longevity suggests effectiveness, until we have proof of our treatments, future generations may find them as quaint and misdirected as we find “the skin of the weasel cut up in small pieces, with butter, a rotten egg, and vinegar” as treatment for founder mentioned by Heresbach (1586).¹⁶⁷

Synopsis

The causes of laminitis are many – often interrelated, sometimes direct opposites. The history of laminitis has been a search for the cause or causes of laminitis and for effective treatments. Going in and out of fashion, many treatments have lasted for centuries, some for millennia, but

very few have been proven even once. Only proven treatments can give us a solid foundation for current treatment and for further research.

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