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Navicular: The Theories, Opinions and Attitudes

Introduction

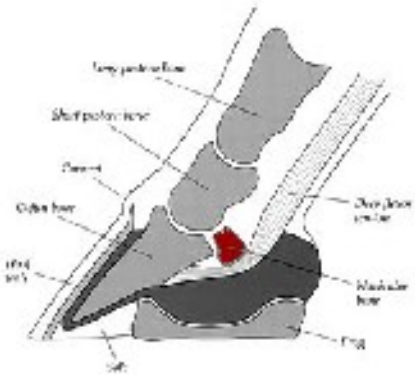
The diagnosis of navicular has brought feelings of helplessness and dismay to many a horse owner. The prospect of the end of a promising career in the show ring or miles logged on the trail, or worse, having to put the horse down, can be discouraging to anyone. Yet, as we shall see, these dire results may not be foregone conclusions where navicular is concerned. Conventional thinking from a traditional veterinary or farrier standpoint says one thing; non-conventional thinking from a the standpoint of a natural trim, considering new research on hoof function, says another, very different thing. These two opposing views can result in the difference between a horse that is crippled or in pain, or with a life cut short, and a horse that enjoys its work, without pain, and with full function and use.

In this paper I will endeavor to show these differing opinions, the theories behind them, how the different treatments are expected to work, and the resulting conclusions of choosing the non-conventional view. A few case histories will be presented to illustrate the value of the non-conventional treatment.

Definitions

What is navicular? Is it a disease with well-defined symptoms and their associated physical changes? Or is it a syndrome, a collection of symptoms with no easily-recognized cause? Or is it something else entirely – perhaps something no more exotic than the hoof's response to unnatural stresses caused by incorrect hoof mechanics, and readily corrected by natural trimming.

The quick answer to the question of what is navicular is that it is "caudal heel pain," that is, pain in the rear portion of the hoof, particularly the heels. However, that definition can even be too general. The first part of defining the condition is to decide if it is a disease or a syndrome. "Disease" implies it has a known cause, with a specific treatment. But there is much debate as to the cause or causes, therefore many veterinarians will label the condition a "syndrome" which is characterized by a group of symptoms which collectively describe an abnormal condition (LaPierre, 2008). Thus options are left open for choosing a treatment based on various diagnostic tests. Since many veterinarians and farriers who follow a conventional model disagree so much as to the specific cause, or even if there is only one or a series of multiple causes, most refer to the condition as a syndrome as opposed to a single disease (Voss, 1994).



from Local Riding (UK) Ltd.

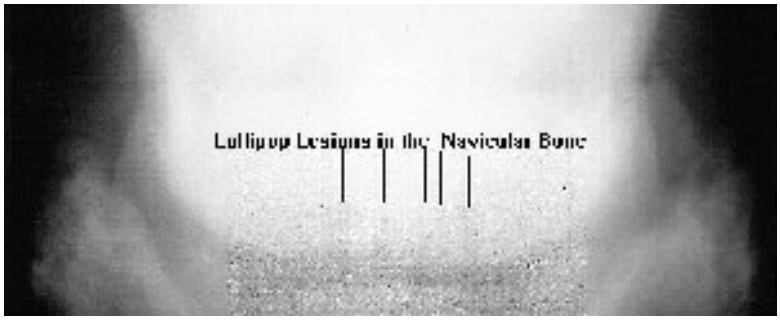
Mechanics

The navicular bone is a sesamoid bone that lies at the caudal aspect of the joint between the second and third phalanges, the short pastern bone and the coffin bone, respectively. It is supported by the impar ligament that attaches it to the rear of the coffin bone. It acts as a

pulley for the deep digital flexor tendon (DDFT), taking some of the stress off the coffin bone (Sutor, 2002). It also acts as a valve for blood flow to the coffin bone and the corium inside the hoof (Sutor, 2002; McClure, 2000). Cartilage lies between the navicular bone and the coffin bone, and also between the navicular bone and the deep digital flexor tendon, which arises from the back of the upper leg and runs over the navicular bone to attach below the impar ligament at the bottom of the coffin bone. The navicular bursa, that lies between the navicular bone and the DDFT, is a small fluid-filled sac that protects both the navicular bone and the DDFT from abrasion (Wikipedia, 2008; McClure, 2000; The Atlanta Equine Clinic [AEC]).

Diagnosis

A horse having the symptoms of navicular will first present with heel pain, in (usually) both front hooves. The horse will "point" its forefeet when standing, often alternating feet, so as to not put so much weight on the heels and will shift from side to side to relieve the pain. During movement the horse will land toe-first, making its gait choppy. The horse is often lame after work, but appears to recover after rest (McClure, 2000). In addition to these observations, a horse suspected of navicular is often diagnosed by other means; clinical testing will include flexion tests, "toe wedge" and "frog wedge" tests, in which a block is placed under the toe to exert more pressure on the DDFT, or under the frog to place pressure directly under the navicular bone, respectively (Webster, Romagosa, Burba), hoof testers to localize the area of tenderness, or temporary nerve blocking to localize the point of the pain in the navicular bone area (Novick, 2006; McClure, 2000). Nerve blocking to the coffin joint can rule out coffin joint synovitis (Webster, Romagosa, Burba). Radiographs show other changes in the bone itself, such as enlarged blood vessel cavities (Strasser, 2007), and "lollipop" lesions, spurring, tiny fractures off the navicular edge, cystic or lytic areas within the bone, and erosion of the contact area between the navicular bone and the DDFT (Novick, 2006; Voss, 1994). MRI studies also show changes in the soft tissues in horses suspected of navicular (Morton, 2006). However, radiographic changes do not always correlate with lameness associated with navicular. Some horses may be sound with large changes, and other horses be lame with minimal radiographic changes (Jones, 2008; Strasser, 2007; Voss, 1994). A final test involves bone scintigraphy, where a increased uptake of radioisotope in the navicular area can be observed on a bone scan, indicating the location of bone remodeling (Webster, Romagosa, Burba).



from Novick, 2006

The Conventional View

Causes

One cause of navicular pain is considered to be changes in the navicular bone itself, resulting in increased friction on the DDFT and the navicular bursa. However, as noted above, bone changes are not always seen in in the radiographs of horses exhibiting heel pain (Jones, 2008). Another theory, also

relating to the navicular bone, is that pressure from the DDFT causes the bone to become more dense, restricting its blood supply, which will then cause additional damage (Jones, 2008). Blood clots in the capillaries that supply the navicular area are thought to do essentially the same thing, particularly as in some cases drugs that increase blood flow seem to bring relief (Jones, 2008). Another theory relating to blood flow is hypertension of the veins, causing them to stretch (Webster, Romagosa, Burba). A suspected cause is though to be in the navicular bursa. When the fluid breaks down and is reduced, there is inflammation which causes pain and more damage, similar to "tennis elbow" (Jones, 2008). Degenerative joint disease in the coffin joint can also occur along with degenerative changes in the navicular bone itself (Jones, 2008).

These are all suggested or suspected causes for navicular syndrome based entirely on wear and tear of a "normal" foot; perhaps exacerbated by additional stresses such as hard jumping or work on hard surfaces (Miller). Another suggestion for a tendency toward developing navicular if not a direct cause is breeding horse with small feet such as Quarter horses, Thoroughbreds (Novick, 2006) and Warmbloods (Voss, 1994) as the pressures involved in the DDFT, the navicular bursa and bone are concentrated in a smaller area, and more directly under the navicular bone (Novick, 2006; Voss, 1994; McClure, 2000).

Conventional Treatments

The treatments considered by those vets and farriers that subscribe to the conventional theory fall into three main categories: drugs, shoes, and surgery. One or a combination of these is almost always recommended by a conventional practitioner for the treatment of navicular. Occasionally, as we shall see, shortening the heels and toes (that is, a more natural trim, although they don't call it that) are combined with shoeing and/or drugs to effect relief. In spite of the various treatments recommended by traditional professionals, all of them are only expected to achieve palliation, or slowing the progression of the disease condition, never real cure.

Drugs

Phenylbutazone (Bute) is used to alleviate the pain of inflammation (Novick, 2006; Webster, Romagosa, Burba). To avoid gastrointestinal problems, 2.2mg/kg of body weight, two times a day, is suggested. This can be given the day before and the day of a competition or riding (Webster, Romagosa, Burba). Where changes in the blood vessels constrict the flow of circulation, isoxuprine is often used to dilate them in order to restore blood flow (Miller; Novick, 2006; Wikipedia, 2008). Eighty percent of horses so treated respond to it, but it has to be repeated (Novick, 2006). Warfarin, a blood thinner, can also help by slowing blood clotting time, but this treatment can be dangerous and requires constant monitoring as the blood thinning will take place all over the body (Wikipedia, 2008; Miller; Jones, 2008). If used, this treatment may have to continue long-term. It is uncertain how it actually works to help navicular; if slow or impeded blood flow due to clots is a cause, then this is expected to dissolve or prevent these clots (Miller). Aspirin can be used in the same way (AEC). Corticosteroids in combination with hyaluronic acid injected into the coffin joint or navicular bursa may provide temporary relief, but should be used with caution as it can mask lameness, and has the potential for abuse (Webster, Romagosa, Burba). Polysulfated glycosaminoglycans (Adequan) added to the feed can also be helpful (Webster, Romagosa, Burba). Finally, nerve blocks, similar to those used in diagnosis but longer-acting, can be used (Novick, 2006; 'Da Kur, 2001). Serapin, a derivative of the

Pitcher plant, is such a neurotoxin. It will deaden a nerve for 2-4 months, at which time it must be repeated. This is is expected to help a horse without resorting to surgery on the nerves and/or tendons (Novick, 2006).

Shoeing and Trimming

For many conventional vets and farriers, shoeing of one sort or another is the mainstay of navicular treatment. Thirty percent of horses are reported to improve with good trimming and/or shoeing ('Da Kur, 2001). Another study indicated that 97% were helped with shoeing, if treated early (Wikipedia, 2008). Egg bar shoes, rolled toe shoes, slippered heel shoes, Tennessee navicular shoes, wide web shoes, and others have all been used "to good effect" on particular horses (Jones, 2008). All proponents of shoeing stress the importance of a balanced trim that shortens the toes and lowers long heels (Miller), particularly trimming so that the lower leg is vertical (AEC). Cutting grooves in the wall or rasping the quarters are aimed at allowing the hoof to decontract (McClure, 2000). Following the trim, most recommend egg-bar shoes, usually with wedge pads (Miller; Wikipedia, 2008), although some feel that wedges exacerbate other heel problems (Wikipedia, 2008). The bar of the shoe is supposed to relieve pressure from the heels (McClure, 2000). Rockering the toe of the shoe to help breakover has been suggested (Wikipedia, 2008). Frog supports are supposed to aid in giving frog pressure (McClure, 2000). A particular application of pads is one that lifts the heel 2-3 degrees (Webster, Romagosa, Burba; Novick, 2006) after trimming the heels 2-3 degrees. This is intended to align the back of the hoof with the front, which is then trimmed to align with the pastern. This is thought to decrease the tension on the DDFT and relieve loading on the collateral and distal sesamoidian ligaments on the navicular bone (Webster, Romagosa, Burba). The heels of this pad are then angled outward ("slippered"), creating and expansion of the heel whenever it touches down. This is to help decontract the foot and aid circulation. The shoe is then positioned so the branches extend further back, (AEC) to increase the weight-bearing area, and avoid it being all concentrated in the navicular area. The pad itself is to provide cushioning to the foot (Novick, 2006).

from Novick, 2006

Surgery

Treatments of last resort, which effectively end a horse's career, involve surgical intervention (Wikipedia, 2008; Jones, 2008; McClure, 2000; Webster, Romagosa, Burba). The first is desmotomy, a cutting of the suspensory ligaments of the navicular bone, which wrap around the pastern and are anchored in the first pastern bone. No one knows why this seems to help, but 80% of horses show some improvement (Novick, 2006). The other surgical treatment is neurectomy ("nerving"), a cutting of the palmar digital nerve. This is to completely, and supposedly permanently, block the pain from the navicular bone, eliminating the related lameness. Long term follow-up has shown that 68% of horses so treated remain "sound" for *at least a year* [italics mine] (Novick, 2006). However, the surgery is not truly permanent as the nerves tend to regrow (Wikipedia, 2008; Webster, Romagosa, Burba), develop neural tumors (neuromas) which are very painful and require further surgery, or develop post-operative infection (Webster, Romagosa, Burba). Techniques intended to counteract nerve regrowth are to cap the nerve ends with a section of nerve sheath, or to make the cut with laser, which tends to melt the ends of the nerve (Novick, 2006). Since after a neurectomy the horse can no longer feel its feet it is more

subject to stumbling, making it unsafe to ride (Jones, 2008) and must be retired to pasture. However, one veterinarian feels that as nerving only deadens the rear two-thirds of the foot, and that since the muscles controlling the foot are higher up in the leg, that the horse is not only safe to ride, but to jump (Novick, 2006).

Prognosis

From a conventional standpoint, the outlook for navicular horses is generally unfavorable (McClure, 2000; Wikipedia, 2008). It is viewed as a degenerative and even permanent condition with little if any hope for cure, unless caught early (Webster, Romagosa, Burba). A horse with signs of navicular is only expected to respond to the aforementioned palliative treatments for a limited period of time, until it becomes too lame to work, and so is put to retirement. When its pain can no longer be managed even at retirement, the horse is euthanized (Miller; Wikipedia, 2008; Webster, Romagosa, Burba).

New Theories of Navicular Based on Natural Hoofcare

Causes

A very broad suspected cause and one supported by almost all natural hoofcare proponents, as well as some conventional veterinarians, is incorrect trimming, including long toes, overlaid bars (Sutor, 2002) and heels that create pressure on the navicular region (Strasser, 2007), and/or shoeing (Voss, 1994; Novick, 2006; Strasser, 2007; Wikipedia, 2008; Ramey, 2003). Or, shoeing at all, in addition to improper trimming and inadequate natural environment, in the opinion of many non-conventional hoofcare practitioners (Sutor, 2002; Wikipedia, 2008). Shoeing, as well as unnatural trimming, can cause aggravated ligament strain on the navicular pulley system (Jackson, 2002). A central theme to the non-conventional idea is that navicular is neither a disease, with a known etiology and treatment, nor a syndrome with no known cause, but a health care problem having a known, man-made cause – that of improper hoof care (Sutor, 2002). A toe-first landing (which may be caused by other heel pain, such as impacted bars (Fathauer, 2006), thrush, over-thinning the frog, underdeveloped digital cushions and frogs, heels taken too short too soon, and not using hoof protection such as boots before transitioning to barefoot is complete (Drossman, 2006))is also mentioned by both conventional and non-conventional practitioners as a major factor in the development of heel pain and navicular-associated degenerative changes (Rooney; Drossman, 2006). In other words, heel pain is the cause of navicular, rather than the other way around (Ramey, 2005). Since the digital cushion begins development as soon as the foal starts walking, and this development continues to adulthood, it would normally be able to support the weight of an adult horse. But if it is under-developed as often happens when horses are shod young, it doesn't give this cushioning support, and the horse lands toe-first to protect the tender rear part of the

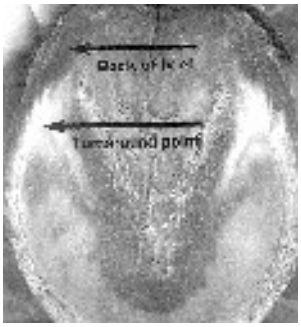
from Novick, 2006

hoof (Ramey, 2005). Another suspected cause that falls into both camps is vibration damage to the navicular cartilage (Rooney). Other suspected causes include corns, sub-solar or frog bruising, wall cracks, puncture wounds, sheared heels, synovitis of the coffin/navicular joint, contracted feet, lack of oxygen and/or circulation, sidebone, adhesions, fractured navicular bone, inflammation, overreach and/or cross-firing injuries, infection of the lateral cartilage, joint soreness, deteriorating cartilage, bones and tendons, etc ('Da Kur, 2001). One non-conventional view is that navicular is not hereditary in any way, but that similar boarding conditions with horses of similar or related breeding may make it seem that way (Sutor, 2002).

Treatments

Natural treatment of navicular is as much about what not to do as what to do. All natural practitioners feel that nerving is not only cruel and ineffective, but dangerous, in that the horse cannot feel its feet and is more likely to stumble, and fall on its rider. Also, founder, abscesses and other injuries to the hoof can go unnoticed, as the horse will not appear lame (Teskey, 2006). Effective treatment from a natural standpoint concentrates on returning the hoof to its natural form (Teskey, 2006), and fixing the underlying problem, as opposed to covering it up just to lengthen the horse's useful life (Sutor, 2002). The natural hoofcare view does not assume that a drugged-up retirement or ultimate euthanasia are foregone conclusions with navicular. In fact, many feel the proper treatments of a balanced barefoot trim and natural lifestyle can not only treat and prevent problems, but actually reverse them, whether or not they have existed for a long, or short term (Sutor, 2002; Teskey, 2006).

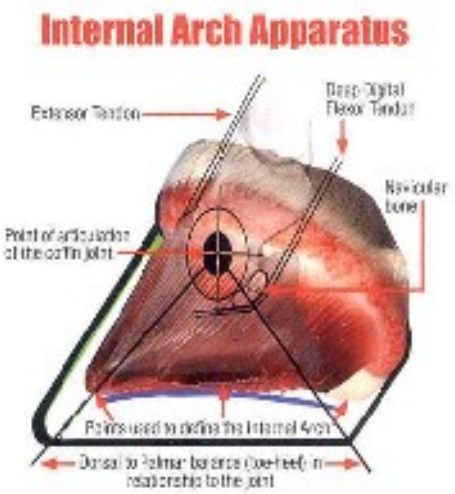
The first treatment form a natural hoofcare standpoint is to pull the shoes, if any, and give the horse a correct trim (Strasser, 2007). It is paramount to encourage a heel-first landing to prevent the unnatural stresses on the ligaments and tendons (Drossman, 2006). Since research shows that there are proprioceptors in the calloused portion of the frog buttress, it is reasonable to assume that a heel-first landing is the natural way the horse has of sensing the ground, especially as feral horses and sound domestic horses have been observed to land heel-first (Ovnicek, 2001). Other research shows that when breakover is placed 1/4" ahead of the tip of the coffin bone and the heels trimmed so the frog buttress has ground contact, pastern alignment is improved and the navicular bone became more vertical (Ovnicek, 2001). A horse that is comfortable in the heel area with healthy frogs and a ground-parallel coffin bone will land heel first. Wedges and overgrown heels mechanically prevent heel-first landing because the coffin bone is no longer ground parallel, even if the raised heel strikes the ground first (Drossman, 2006).



(c) The Horse's Hoof

To make sure that the heels are comfortable, one trimmer suggest trimming the buttress to a flat "platform" so that the outer point of wall horn, the buttress at the back of the heel, is between 3/8" and 5/8" from the inner corner, where the wall meets the bar at the seat of corn (the "turnaround point"). This creates a broader area on which to load the heel, spreading the force of impact (Welz, 2008). Bars should be trimmed to no longer than half the length of the frog to prevent pressure damage to the sole corium (Fathauer, 2006). The heel of the foot, namely the frog and digital cushion, should be stimulated to develop by trimming to put them in a greater support role. This must be done gradually so as not to sore the horse and make it land toe-first again (Ramey, 2005). Pea gravel should be provided

in places the horse spends a lot of time in, as well as plenty of exercise; either self-exercise with other horses or riding on terrain the horse can currently land heel-first on (Ramey, 2005). Boots and appropriate pads can be used to help stimulate the frogs and digital cushion, and perhaps also dampen vibration (Ramey, 2005). In other words, in order to heal from navicular, a horse needs to be given a natural trim at regular intervals of four weeks, movement at liberty and time to heal, then lunging, and boots for riding initially until the horse has adapted to its environment (Jackson, 2002).



from LaPierre, 2008

While almost all natural trimming advocates agree on the why's and wherefore's and especially the what's (to do or not do) regarding navicular syndrome or problem, one stands out somewhat in his definition of the internal structures and mechanism, which is why I am putting it in a separate discussion. K.C. LaPierre (2008) proposes the model of the Internal Arch Apparatus, which comprises all of the internal structures of the hoof, minus the hoof capsule itself. This includes the coffin bone, navicular bone, distal articulating surface of the short pastern bone (P2), all the connective tissues – ligaments, tendons, and fascia -- the digital cushion, and all of the corium (the inner layers of the foot containing the nerves and blood vessels that grow the hoof capsule). Since this model includes the navicular apparatus, then any discussion of heel pain deriving from it must address the entire internal arch apparatus. Where K.C. LaPierre differs from most other natural hoofcare professionals, is that he believes that, rather than the outside of the hoof mirroring what goes on inside the hoof, the inside is a mirror of the outside. This, he feels, keeps one from being reactive to the inner structures, fixing things after the hoof has grown wrong, as it were; if we understand that external stimuli affect the hoof's inner structure, we are more empowered to change it. He also feels that lameness due to bone changes, what he refers to as true navicular disease, comes about after a long period of recurring events, such as balance changes, increased vibration, friction and/or pressure. Since the soft tissues will react first, followed by changes in the resulting growth of the horn, the hoof will show deformity before there are any bone changes. The changes and resulting deformity are due to the fact that the horse loads its foot differently due to pain.

Treatment under this model involves returning the foot to its proper biomechanical function. This includes assessing where the heels are in relation to the center axis of the coffin joint. Simply trimming the heels to the widest part of the frog or reducing breakover does not address the loss of internal structure, which is really what causes the stresses on the joint resulting in pain. Instead, K.C. LaPierre advocates providing the correct stimulus to the foot which will help restore sound structure and function. Correct trimming to achieve balance of the hoof with that of the internal arch apparatus, appropriate stimulus in the the form of exercise and pressure to strengthen the weakened structures and pain management, including the use of homeopathics and closed-cell foam pads, are all part of the rehabilitation strategy (LaPierre, 2008).

Prognosis

From a non-conventional hoofcare view, prognosis is quite optimistic. Since most all believe the horse

can be restored to full soundness, depending on how long the problem existed, or even not depending on that, a horse with navicular treated with natural trimming methods can be considered curable in every sense of the word (Strasser, 2007; Ramey, 2003; Jackson, 2002).

Case Histories Using Natural Trimming Methods

Crystal
An 8-year-old Swedish warmblood, previously used for showing and jumping, was intended to be used as a broodmare after her diagnosis of navicular syndrome. She was considered "middle-aged" and her condition incurable. Neurectomy was recommended by the attending vet. She was sold to a new owner who consulted with Dr. Tomas Teskey DVM who urged against a neurectomy but did recommend trimming the mare to correct hoof form, along with plenty of movement on firm terrain. She was given a large turnout (50' x 100') with another horse to keep her active, was allowed free-choice grass hay and minerals, and was fed a variety of herbs and vegetables. In a few months she had recovered enough to be readied for returning to showing and jumping the following spring (Teskey, 2006).

Strasser study
Over a period of 3 years, 53 horses were treated for navicular according to the methods of Dr. Hildrud Strasser. The shoes were removed, and living conditions were changed to approximate as much as possible the amount of movement a wild horse receives daily. The shape of the hoof capsule was gradually returned to as close as possible to the natural hoof form. Depending on how long the condition existed, and how closely to natural the living conditions could be matched, the horses all returned to full use in a few weeks to nine months. No relapses were noted (Strasser, 2007).

Thoroughbred mare
A six-year-old Thoroughbred mare began experiencing "vague, unexplained" lameness, that came and went. After two years, it was diagnoses as navicular. For the next six years the horse was treated with various shoes, pads, gels, etc. with no improvement; in fact her condition worsened. Finally, as she was basically retired, her shoes were pulled. Her pastern angles soon improved, her heels de-contracted and she became more comfortable. Her owner now trims the mare according to the wild horse model, and is continuing to see improvement in her hooves, even after years of dysfunction and deformation. She now runs around like a two-year-old, clearly indicating a complete lack of pain in her feet (Jackson, 2002).

Navicular disease
A nine year old former champion working cow horse, arrived at the Fischer Equine Lameness Foundation Clinic with the diagnosis of navicular syndrome. The prior treatment prescribed for this horse was stall rest and orthopedic shoeing consisting of wedge pads and egg bar shoes. This treatment was performed for two years and was unsuccessful. The horse had also undergone removal of his splint bone on the left front limb and bone fragments removed from his left knee. This surgical treatment had also failed. Upon arrival at the Fischer Equine Lameness Foundation Clinic, the veterinarian obtained x-rays, blood workup, general health assessment and floated his teeth. Four months after first trim the horse was comfortable and returned to the pasture setting. Six months after first trim the horse was able

to be trail ridden. One year after first trim, the horse was put back into full time work in the arena and ridden on the trails. Fourteen months after first trim, the horse is shown in barrels, poles, and key hole successfully (Fischer).

Summary/Conclusion

In this paper, we have seen that navicular treatments, even diagnoses and definitions, differ greatly between the two camps of conventional therapy and that of the natural barefoot model. Even within each camp are variations. However, we have seen that overall, the conventional view is that navicular syndrome is a condition that must be managed as long as possible to keep the horse in useful work, if only for another year or so, as though it were a mechanical implement that brought nothing but financial value to its owner. When this no longer worked, and there seemed to be in almost every traditional vet or farrier's view this inevitability, the horse was either drugged to deaden pain or nerved (if it wasn't before) and ultimately euthanized.

The natural trimming view is that navicular is totally curable by restoring the hoof to correct form and function. If the horse can be so treated, without surgery, without unnatural appliances nailed to the foot, long-term drugs (aside from a a short course of bute, homeopathy, or other brief pain-relieving treatments) or ending up in early retirement or dead, then how can a person whose relationship with his/her horse is that of a partner or even a family member, seek the conventional route?

The evidence of the two views as reviewed in this paper along with the irrefutable evidence of case histories, indicate that the conventional treatments of navicular syndrome have really nothing to offer of value, and should be scrapped in favor of the new understanding of hoof form, function and internal structures. Many a horse would be returned to full soundness by these methods, and enjoy a comfortable working life well into their senior years.

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