

## Research Needed to Better Understand Navicular Disease

**On Behalf of the Equine Research Coordination Group**

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The anatomy of the navicular bone (NB) area is quite complex with many soft tissue structures surrounding the bone including the impar and suspensory ligaments, the navicular bursa and the deep flexor tendon (DDFT). Image courtesy AAEP. Navicular disease was first described 250 years ago, when it was called “coffin joint lameness” because the lameness came from inside the horse’s hoof. Nearly a century later, the term “navicular joint disease” began to be used to describe the degenerative disease. Navicular affects the horse’s navicular bone, the small bone in the back of the foot, as well as associated structures such as the coffin joint, the impar ligament, suspensory ligament of the navicular bone, the navicular bursa, and the deep flexor tendon.

First used to evaluate the navicular bone in the 1930s, radiographs provide important information about changes in the bone structure associated with the condition. In the 1970s, renewed interest in the investigation of navicular disease led many to believe it was actually a complex condition involving many tissues and not just the navicular bone. These conclusions led to the description of the lameness as navicular syndrome.

New technology and techniques have made it possible to visualize portions of soft tissue structures, but not until magnetic resonance imaging began to be used was the extent of these soft tissue injuries truly understood. As a result, a plethora of new information regarding injuries associated with navicular disease is now available, but the question that remains is what the new information means.

Navicular disease or navicular syndrome, which is more correctly termed palmar foot pain syndrome, accounts for one-third of all chronic forelimb lameness in horses. Why do these horses become lame? Some studies have shown that, at least for some of these animals, the interaction between the navicular bone, its bursa and deep flexor tendon creates a situation similar to osteoarthritis, except the degenerative process involves fibrocartilage on the back of the navicular bone and the adjacent flexor tendon.

Navicular disease is a degenerative disorder theoretically caused by excessive and sustained forces of compression at the distal one half of the bone. Abnormal forces from faulty conformation hypothetically cause biomechanical stresses on the navicular bone and cause remodeling changes. As long as the remodeling in response to these forces is slow, no problems occur. But when the biomechanical stresses exceed physiologic levels, degenerative disease in the fibrocartilage of the flexor surface causes changes in the underlying subchondral bone and bone marrow. Alterations in the bone lead to edema and subsequent venous hypertension and navicular bone-related pain.

Diagnosis of navicular disease is based on an overall evaluation of the hoof that includes: (1) response to diagnostic manipulative tests; (2) response of the lameness to diagnostic analgesia; (3) imaging of the foot; and (4) evaluation of hoof conformation. The diagnosis is made based on the clinical signs and may be corroborated by radiographic evaluation. However, radiographs alone do not diagnose the disease.

The first steps developing a logical approach to the treatment of this hoof lameness are an accurate assessment of the pain and careful evaluation of hoof structure that may predispose it to the condition or cause the pain. Treatment then should be based on the type of and location of the disease. Shoeing should be the basis of all treatment, and any medicinal or surgical therapy should be as an adjunct to shoeing.

To prevent navicular disease, consistent care from a farrier is necessary to keep the hoof in good condition and to address issues of imbalance as they arise. Hoof care is also the area that needs the most research. At this point, clinical evidence of the effects of trimming and shoeing on soundness are largely empirical or the result of trial and error.

To fully understand navicular disease and injury to all the structures involved, additional research is needed to investigate the effects of trimming on the growth of hoof capsule; the effects of shoeing on the growth and physiology of the hoof capsule; and how limb and hoof conformation is related to the biomechanics of the foot and navicular bone. Studies to define how footing and type of performance affect navicular-associated structures are also needed.



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