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## Navicular Syndrome

### Definition

Navicular Disease/Syndrom is a chronic forelimb lameness with pain arising from the Distal Sesamoid (DS) and closely related structures, this is accompanied with the degeneration of the Navicular bone and its surrounding anatomical structures with the loss of their mechanical function.

### Anatomy

The anatomical structures involved with Navicular are;

- Distal Sesamoid
- Complementary fibro cartilage
- Navicular Suspensory Ligament
- Distal Impar Ligament
- Navicular Bursa
- Deep Digital Flexor Tendon
- Distal interphalangeal Joint
- Collateral Ligaments of the Distal interphalangeal Joint

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## Causes

Navicular has several causes that can cause pain in the palmar aspect of the foot. there are 2 theories of Navicular that both result in the same degeneration of the Navicular theory.

### Vascular Theory

Vascular Theory is the reduction of blood flow to the Distal Sesamoid, this reduction in blood flow leads to a reduction of nutrition to the Navicular area.

The blood supply to the Distal Sesamoid is 1/3 Proximal 2/3 Distal meaning the Distal Sesamoid received most of its nutrition from below further supporting the Vascular Theory.

### Biomechanical Theory

Poor Conformation (Broken Back HPA & Long toe/Low Heels) puts more concussion and Vibration through the Distal Sesamoid overloading Distal Sesamoid and the surrounding structures



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The Distal Sesamoid acts as a fulcrum for the Deep Digital Flexor Tendon as it passes over the Distal Interphalangeal Joint, this compresses the Distal Sesamoid into the Distal Interphalangeal Joint, this compression puts stress on the Navicular bursa and Complementary fibro cartilage on the tendon surface of the Distal Sesamoid leading to degeneration, this supports the biomechanical theory.

## **Clinical Signs**

The signs of Navicular can be seen first by the owner as a lameness when the horse is worked. This lameness can improve when the horse is worked on soft ground and will become worse with rest, the lameness can also be worse on hard ground and mechanised surfaces.

Other signs are

- ✚ pointing of the fore feet (this is relieving pressure on the palmar aspect of the feet)
- ✚ Pottery gate
- ✚ lameness on one or both feet
- ✚ Abnormal shoe ware ( heavy toe ware)
- ✚ Loss of Performance
- ✚ lameness will be worse on hard ground

Tension and Compression are the main forces involved in the degeneration of the anatomical structures and the biomechanical changes within the foot that affect the foot in the following ways.

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## Compression

Chronic **Compression** of the Distal Sesamoid caused by the Deep Digital Flexor Tendon can cause;

- ✚ inflammation of the Navicular Bursa
- ✚ Flattening of the Complementary fibro cartilage. (Making it less efficient in reducing friction and concussion).
- ✚ Erosion of the Complementary fibro cartilage and Sub Chondral Bone.
- ✚ Adhesion between the Deep Digital Flexor Tendon and the Distal Sesamoid.
- ✚ Increased bone density beneath the cartilage making the bone brittle and prone to fractures.

## Tension

Chronic **Tension** puts excess loading on the Navicular area and can cause the following

- ✚ Added tension on the ligaments lead to the degeneration of the structures and make them prone to strains.
- ✚ The Navicular Suspensory ligament can become torn away from the Distal Sesamoid.
- ✚ Excess loading of the Navicular Suspensory ligaments can cause new bone growth on the outer edges of the bone, this can be seen on radiographs and is called **canoeing** , the Navicular bone looks longer with raised tips on radiographs.
- ✚ Restriction of blood flow away from the Navicular bone causes by the inflammation of the distal impar ligament and other surrounding structures increases the blood pressure within the bone . in response to the increased blood pressure the bone remodels by absorbing some of the minerals from the centre of the bone, this can be seen by enlarged foramen along the distal edge that is sometimes called **lollipoping**.

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## Diagnosis

Diagnosis is based on the clinical signs observed by the horse, as well as other indicators.

- + Abnormal shoe ware ( toe heavy )
- + Lameness
- + pointing of the fore feet (this is reliving pressure on the palmer aspect of the feet)
- + Pottery gate
- + lameness on one or both feet
- + Loss of Performance
- + lameness will be worse on hard ground

A true diagnosis can only be made by a veterinary surgeon with the aid of

- + Nerve Blocks can isolate where pain is coming from.
  1. Palmar Digital Nerve blocks the palmar aspect of the foot
  2. Bursal Block affects the Navicular Bursa
- + Thermographs
  1. increased thermal radiation indicates inflammation is taking place
- + Radiography's can show the degeneration & remodelling of the Distal Sesamoid and shows Lollipoping (enlarged vascular Fossae) & canoeing (bony spurs) as well as the general degeneration of the area
  1. DP
  2. DP up
  3. DPr-PaDio
  4. PPr-DoDiO

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## Veterinary Treatment

Veterinary treatment is aimed at reducing pain and regaining blood flow.

For the reduction of pain veterinary surgeons can give NSAID's can perform surgery in the form of.

- + **Neurectomy** (de-nerving ) by cutting Both Palmer Digital Nerves.
  1. This can lead to injuries going undetected and Neuroma Formation nodules form at the cut end on the nerves and can be very painful.
- + **Desmotomy** of the Navicular Suspensory Ligament
  1. This is only successful 50 % of the time and can cause a toe in conformation.

To aid in the regeneration of blood flow veterinary surgeons can use drugs such as;

- + **Isoxsuprine** - Dilates blood vessel allowing for improved blood flow
- + **Pentoxifyline** (Trental) - used to improve blood flow
- + **Warfarin** - Reduces the likelihood of blood clotting

## Farriery Treatment

Farriery treatment is aimed are achieving the following

- + Correct 3 Axis Balance
- + Correct Hoot Pastern Axis
- + Protect & Support the Navicular area
- + Reduce Lever Forces
- + Reduce Tension on the Navicular area

A static and dynamic assessment will aid in a good trim and allow the farrier to correct any defects.

Once the trim is complete then shoe choice can help the bio-mechanical function of the foot. The first stage can be using a rolled toe to help reduce the forces of brakover with good caudal support.

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Other options available are

-  Raised Heel / Rolled toe
-  Egg Bar
-  Memphis Bar

The use of bar shoes will give the best caudal support and can help hold the foot together, the disadvantage of Bar Shoes & Raised Heels can become heavy and the use of aluminium can reduce the weigh but can also increase the impact forces as it does not allow for the natural slip of the foot in mechanised roads surfaces, filling the sole with a soft polymer can help reduce these forces.

## Prognosis

Due to Navicular being a degenerative disease a guarded prognosis must given as the condition can only be managed and not cured . Horses with navicular will have a shortened athletic career but if they respond to treatment then there will have a continued working like at a reduced work load.

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